

RISE

RESEARCH ON IMPROVING
SYSTEMS OF EDUCATION

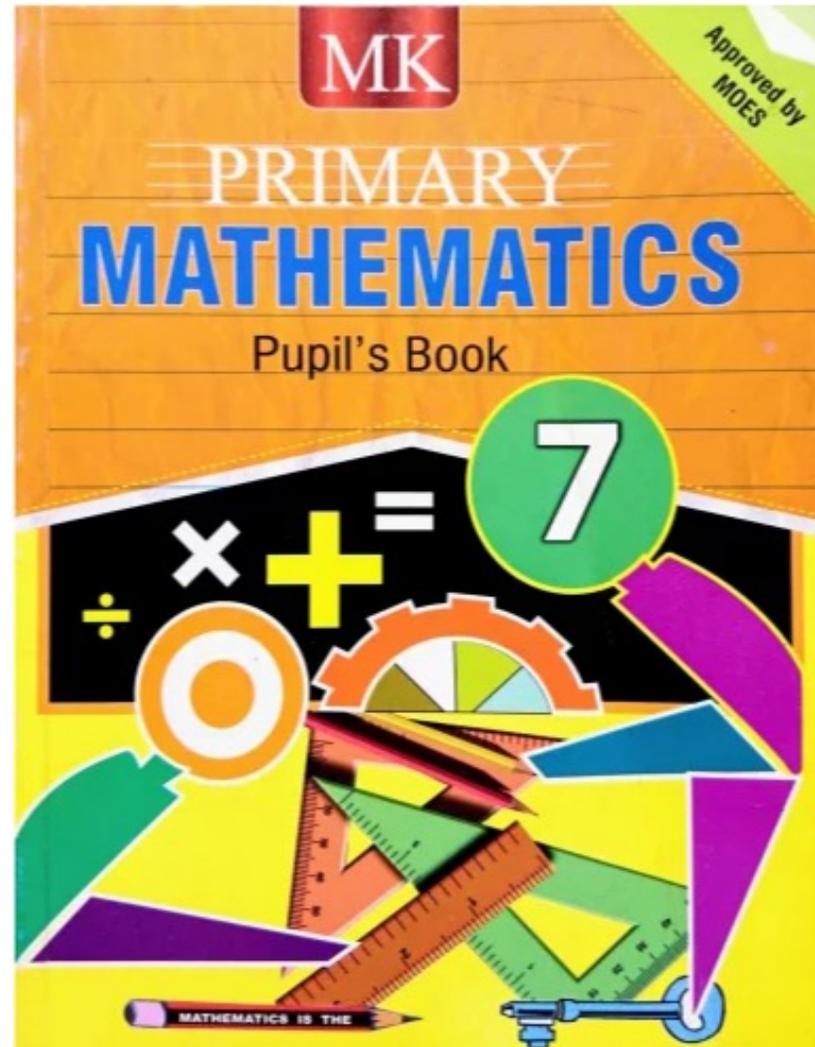
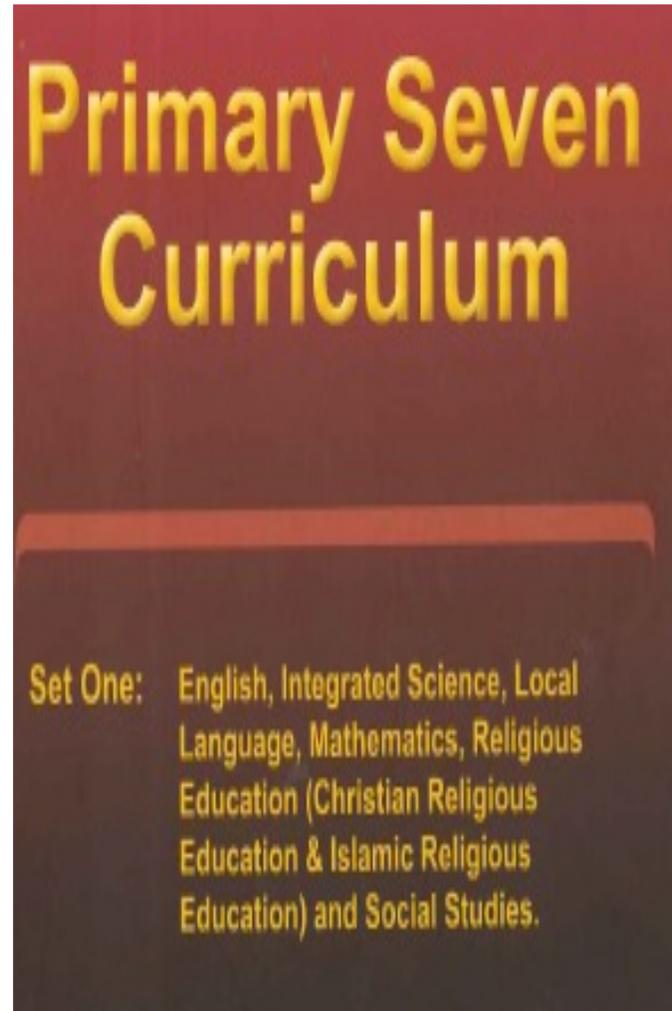
Surveys of Enacted Curriculum

Interpreting SEC outputs 3D content maps

May 2022



Instructional resources



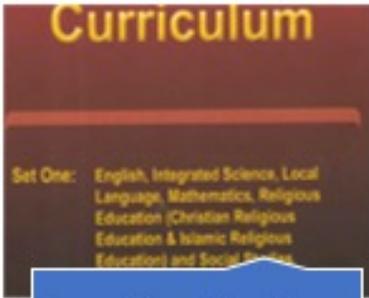
THE REPUBLIC OF UGANDA
Ministry of Education and Sports

ABRIDGED CURRICULUM

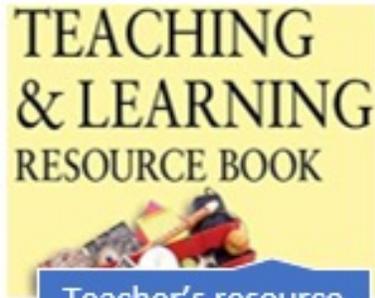
For PRIMARY SCHOOLS

Teacher's Orientation Manual 2022

Instructional resources



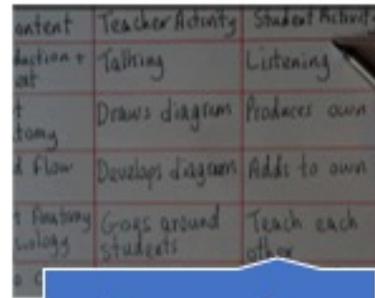
Learning objectives



Teacher's resource book



Teacher's guide



Lesson plan

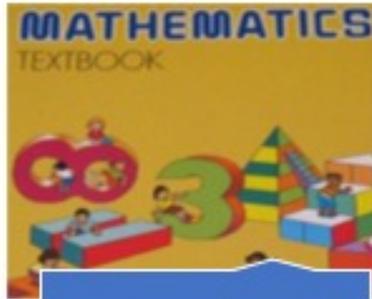
All these resources contribute to children's opportunity to learn.



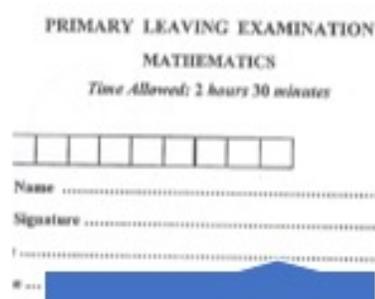
Classroom instruction



Teaching aids



Student's textbook



National Exam

Que. What content is embedded in these resources?



Assessing learning



Assessing learning

Steps	Notes	Indication Steps
Understanding Problem	0 1 2	No answer available Part of the problem is understood Understanding the problem well
Choosing Strategy	0 1 2	No answer available or wrong with strategy Identifies strategy that will solve the problem Identifies strategy that will solve the problem
Executing Strategy	0 1 2	No strategy to perform solution Performs part of the strategy correctly Performs the strategy correctly
Reflecting on strategy correctly	0 1	No answer available on writing

Marking scheme



Learning profile

Que. How does one arrive at a decision on the relevance of these resources for children's learning?

Surveys of Enacted Curriculum (SEC)

- Tools for academic content analysis, alignment analysis, and teacher support (Blank, Porter, & Smithson, 2001; Smithson, 2013)
- Systematic analysis, quantification of academic content embedded in curriculum resources.
- Map academic content on three dimensional displays that reveal relative emphases across different curricula content areas.
- Describe coverage, sequence and pace of curricula and diagnose sources of misalignment within and between curricula components.
- Produce a set of indicators to guide policy on educational curriculum development, review and reform.
- Facilitate teacher reflection, professional development and review of classroom instructional content and practices.

SEC inputs – outputs

Mathematics Taxonomy - Uganda

00 Nbr. sense / Properties/ Relationships	300 Measurement
01 Place value	301 Use of measuring instruments
02 Whole numbers and Integers	302 Theory (arbitrary, standard units as
03 Operations	303 Conversions
04 Fractions	304 Metric (SI) system
05 Decimals	305 Length and perimeter
06 Percents	306 Area and volume
07 Ratio and proportion	307 Surface Area
08 Patterns	308 Direction, Location
9 Real and/or Rational numbers	309 Angles

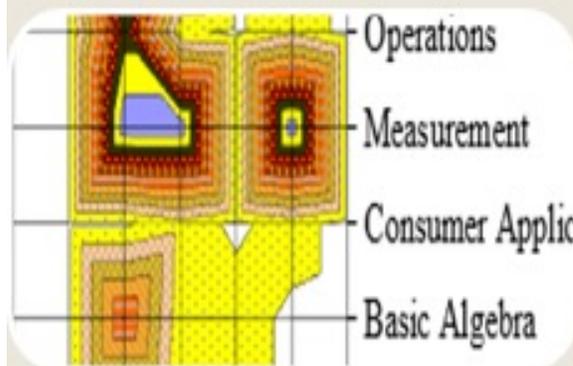
Taxonomy of topics/subtopics

B	C	D	E
Memorize Facts, Definitions, Formulas	Perform Procedures	Demonstrate Understanding of Mathematical Ideas	Conjecture, Analyze, Generalize, Prove
Recite basic mathematical facts	Use numbers to count, order, describe	Communicate mathematical ideas	Determine the truth of a mathematical pattern or proposition
Recall mathematics terms and definitions	Do computational procedures or algorithms	Use representations to model mathematical ideas	Write formal or informal proofs
Recall formulas and computational procedures	Follow procedures / instructions	Explain findings and results from data analysis strategies	Recognize, generate or create patterns

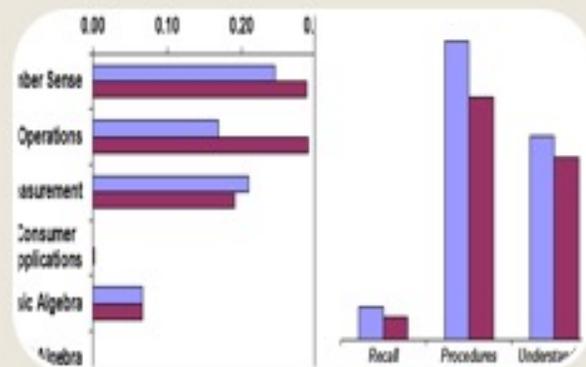
Performance expectations for students learning

Converts numbers from other bases to base ten and vice versa.	P7.13	117	C	116	
Adds, subtracts and multiples in binary system up to 5 digits.	P7.14	117	C		
Applies the basic operations integrated with commutative, associative and distributive properties.	P7.15	204	C	204	F
Writes numbers in expanded form and vice versa.	P7.16	103	D	114	D
Writes numbers in standard form.	P7.17	110	C	110	D
Prime factorizes whole numbers.	P7.18	111	C	512	E
Writes prime factors of whole numbers	P7.19	111	C	111	D
Finds the square roots of square numbers	P7.20	513	C	513	E
Solves problems involving application of square roots.	P7.21	513	D	513	F
Finds out whether a number is divisible by another using divisibility	P7.22	111	E	111	D

Teacher or expert judgement of content & practices



Descriptive content maps

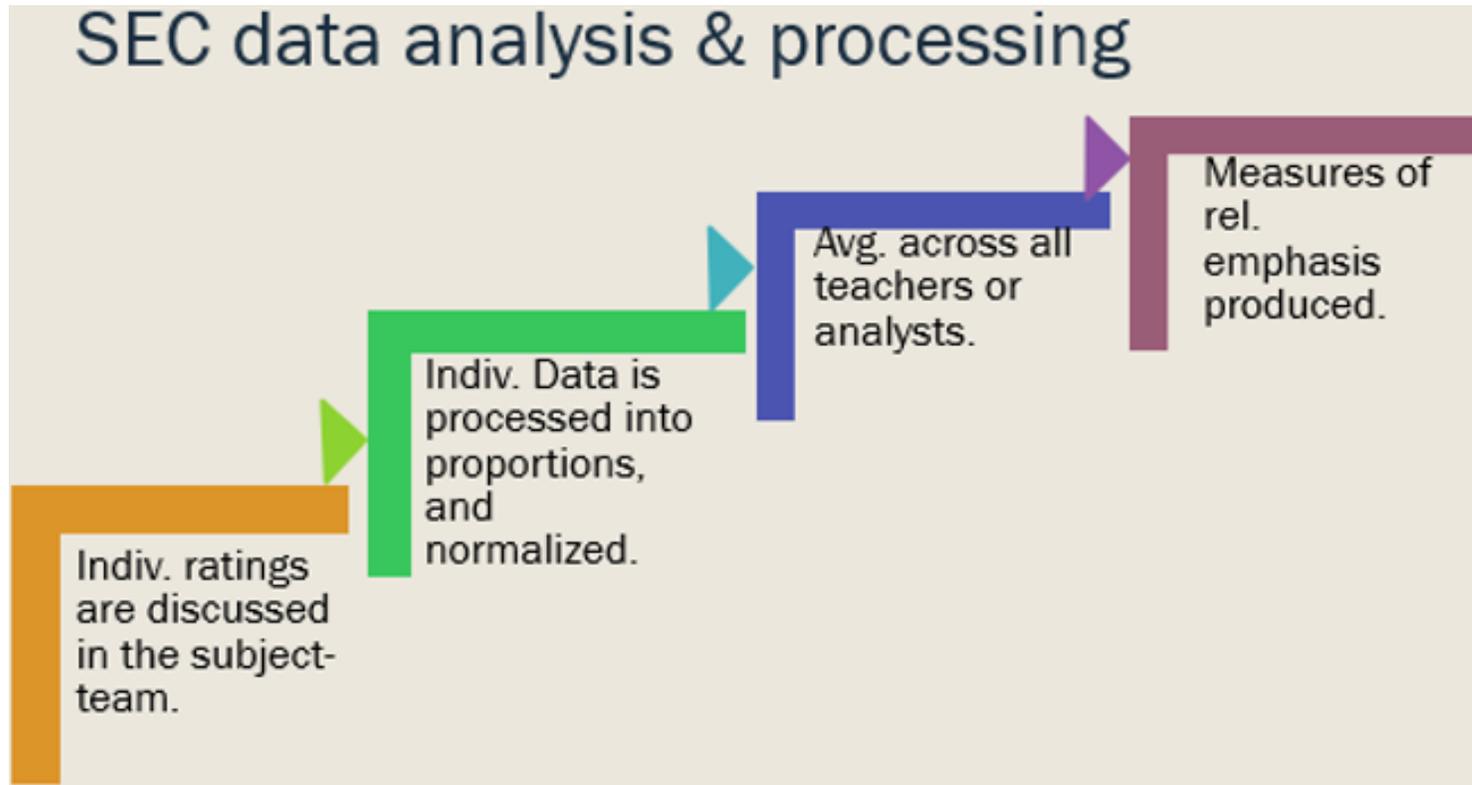


User-friendly marginal charts

Primary 5 teachers all	(Topics)			(Cog. Dmn.)
	Alignment	Balance of Representation	Categorical Concurrence	Cognitive Complexity
Number Sense	0.37	0.06	0.58	0.73
Operations	0.35	0.07	0.60	0.27
Measurement	0.24	-0.01	0.42	0.67
Consumer Applications	0.00	0.00	0.00	0.15
Basic Algebra	0.22	0.01	0.41	0.71

Alignment tables & indices

Processing SEC data



		Cognitive Demand					
		Assessment		Standards			
Topics		.3	0	.1	.2	0	.1
		0	.1	0	0	.2	0
		0	.2	.1	.1	.2	.1
		0	.1	.1	0	0	.1

$$\text{Alignment Index} = 1 - \frac{\sum |x - y|}{2}$$

Values of the alignment index range between 0 and 1

Porter (2002)

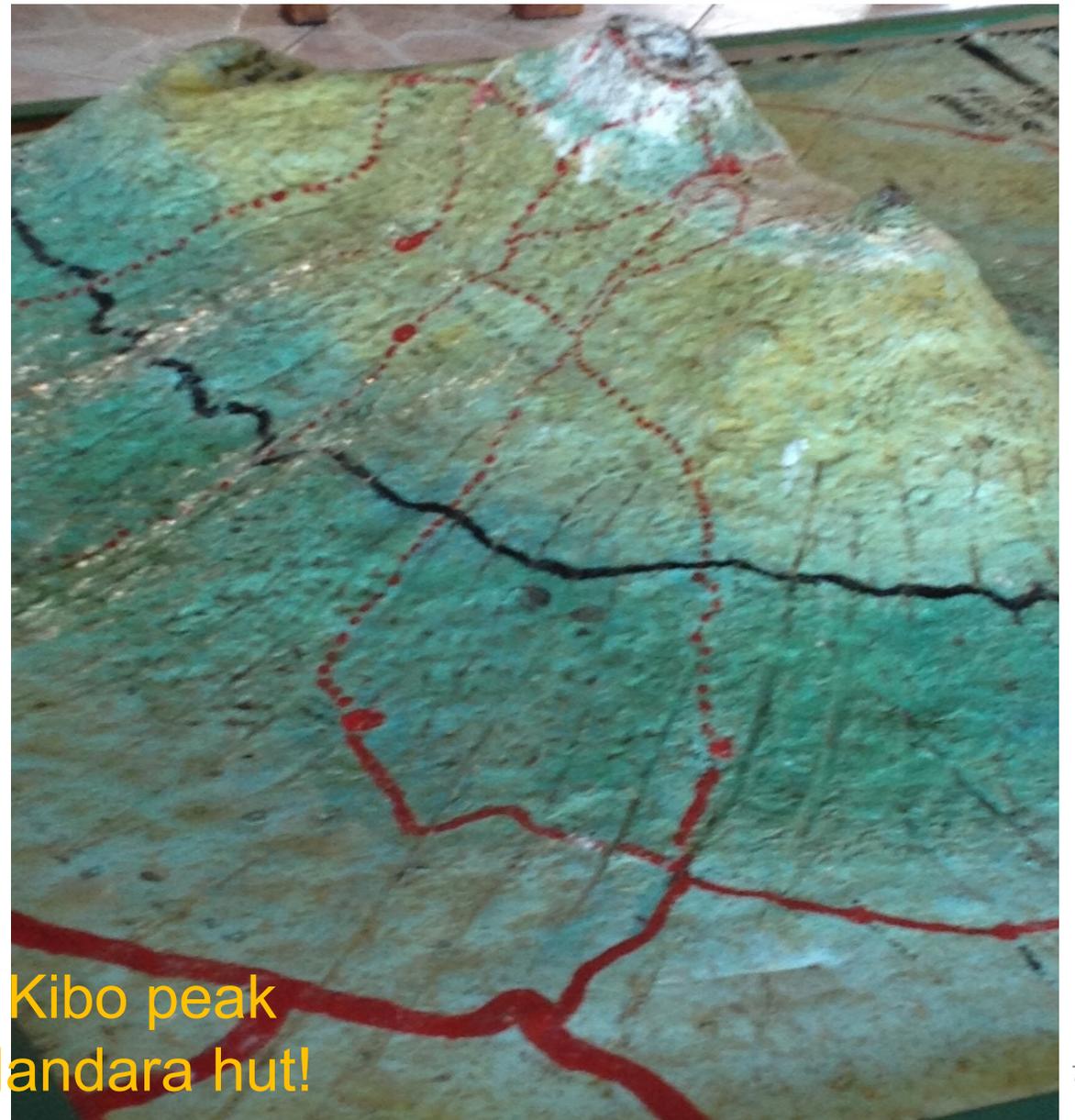
Climbing the Kilimanjaro – one contour at a time!

a Game Reserve
a Kilimanjaro National Park
Tourism Activities by Mwl.
rage Nyerere; 1st President
epublic
s a World Heritage Site
s Natural Wonder of Africa

- 1921: Ilitangazwa kuwa Pori la Akiba
- 1973: Ilitangazwa kuwa Hifadhi ya Taifa Kili
- 1977: Kazi za utalii zilifunguliwa rasmi na M
Kambarage Nyerere; Rais wa kwanza
Jamuhuri ya Muungano Tanzania
- 1987: Ilitangazwa kama Urithi wa Dunia
- 2013: Ilitangazwa kuwa moja ya Maajabu
Asili Afrika

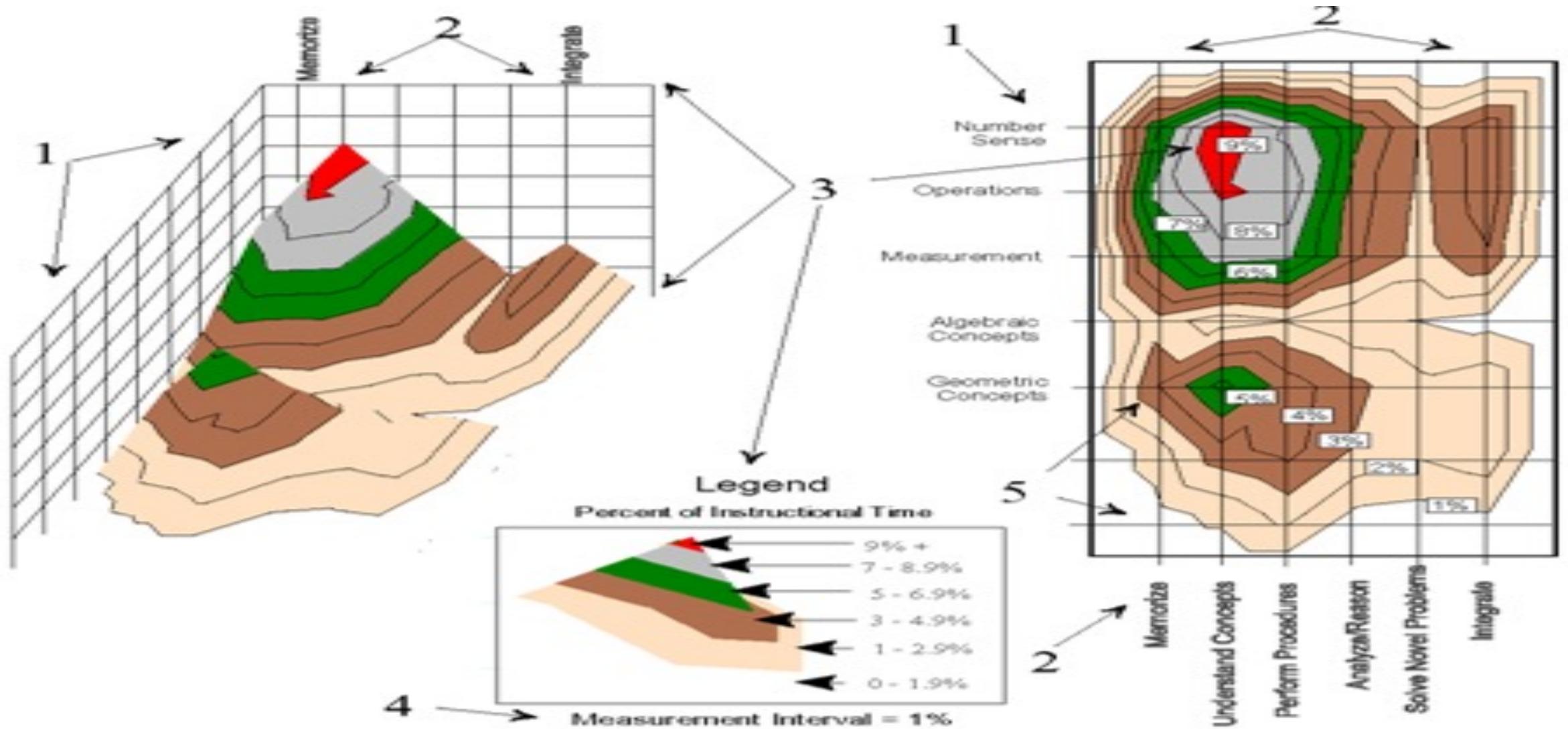


manjaro" with its three peaks; Shira (3962M), Mawenzi (5149M) and Kibo (5895
aro, na vilele vyake vitatu; Shira (Mita 3962), Mawenzi (Mita 5149) na Kibo (Mita

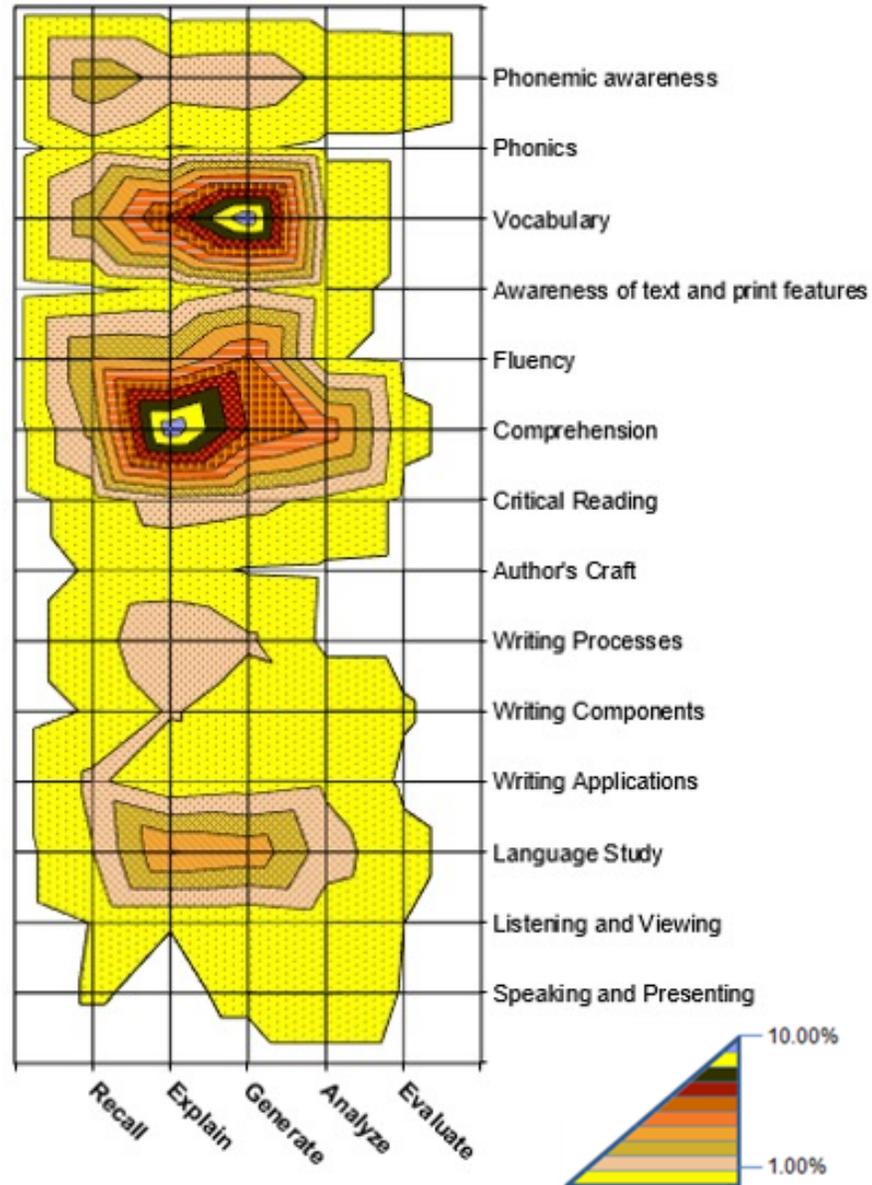


19 hrs for 34 Kms to Uhuru hut ~ Kibo peak
May – 2017: 2 hrs. for 8Kms to Mandara hut!

Amount to emphasis



3D content maps: focus at the intersection!



What learners should know:

High emphasis on vocabulary (21%) and comprehension (24%).

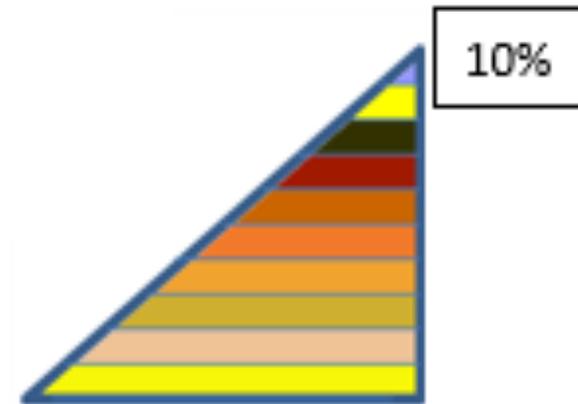
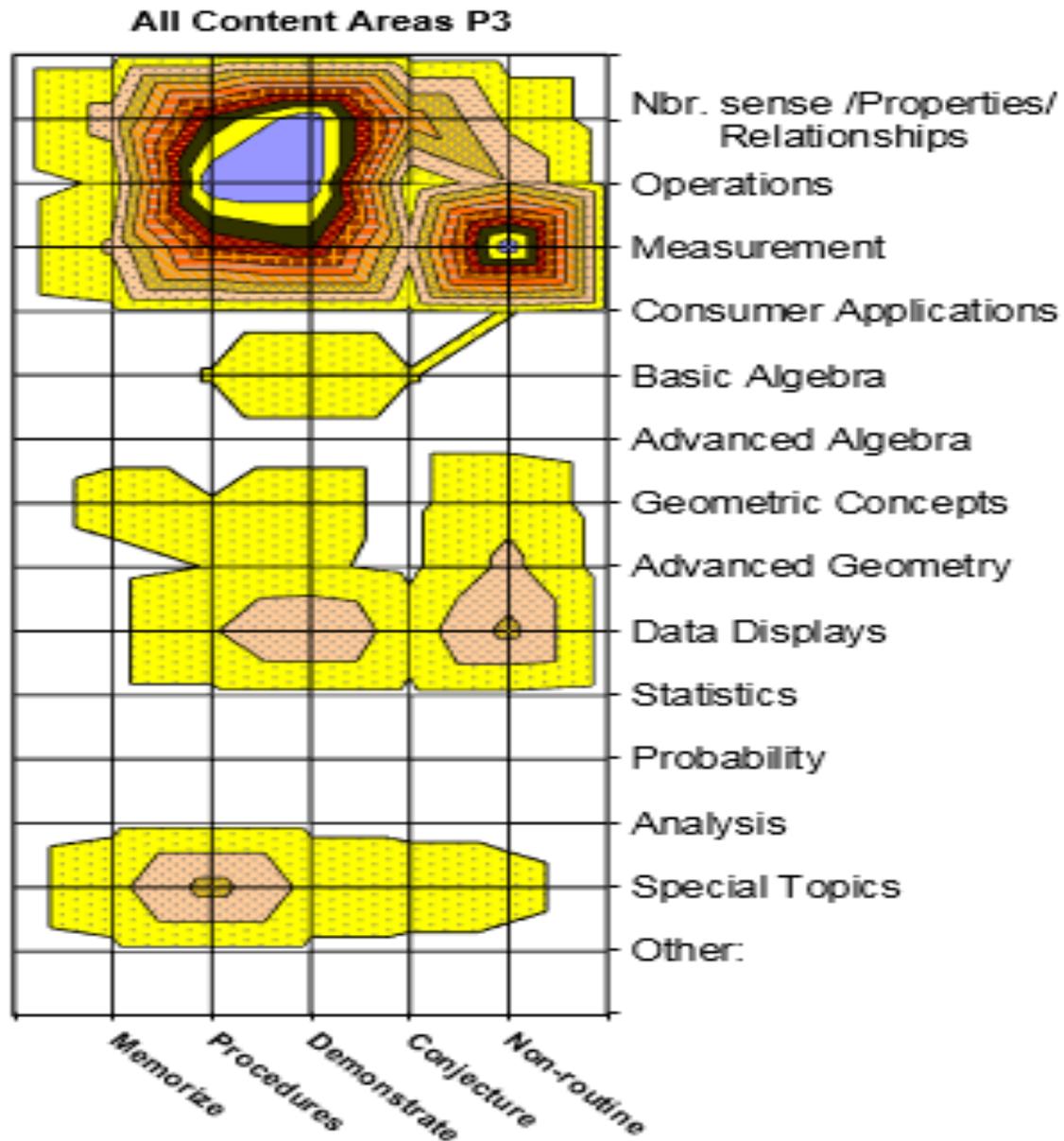
Moderately high emphasis on Language study (??%) and Phonemic awareness (8%).

Minimal emphasis on the remaining topics while phonics is mostly absent (only 1%).

What learners should be able to do:

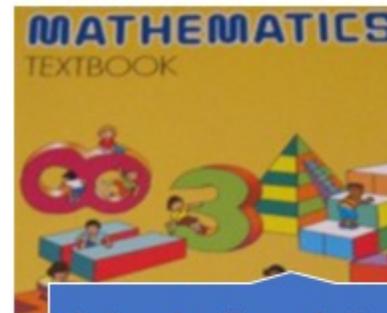
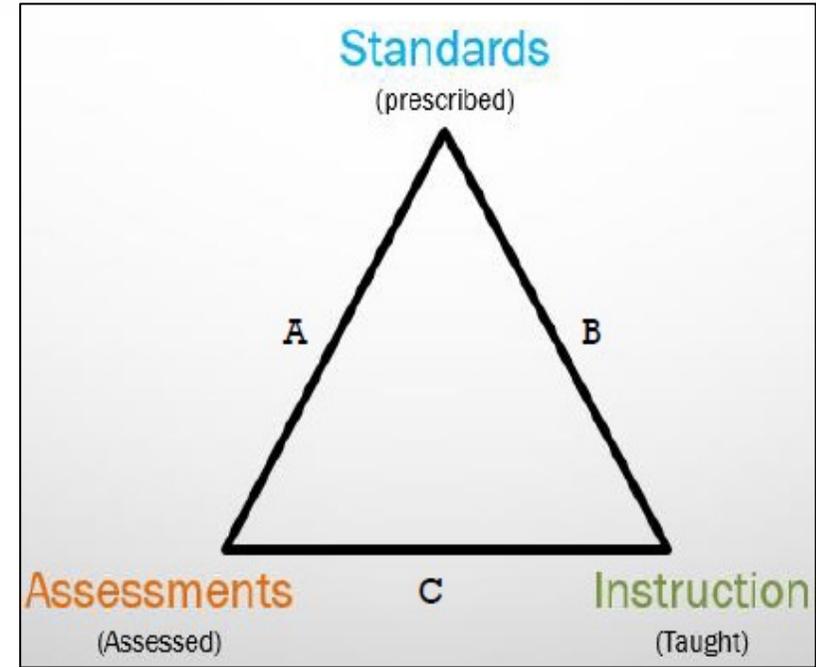
Most emphasis is on “performing procedures” and “demonstrating understanding.”

3D content maps: focus at the Intersection!

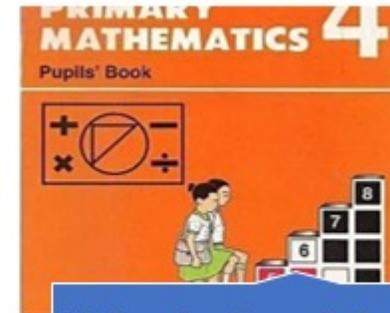


Alignment analysis

- **Instructional alignment is important for learning** (Gamoran et al., 1997; Porter, 2002; Smithson and Collares, 2007; Banerjee et al., 2016; Crouch and DeStefano, 2017; Piper et al., 2018; Crouch, 2020;)
- **Alignment between different components assures system coherence.**
- **Alignment within a component facilitates the right level of ambition (progression pace).**



Math Book3



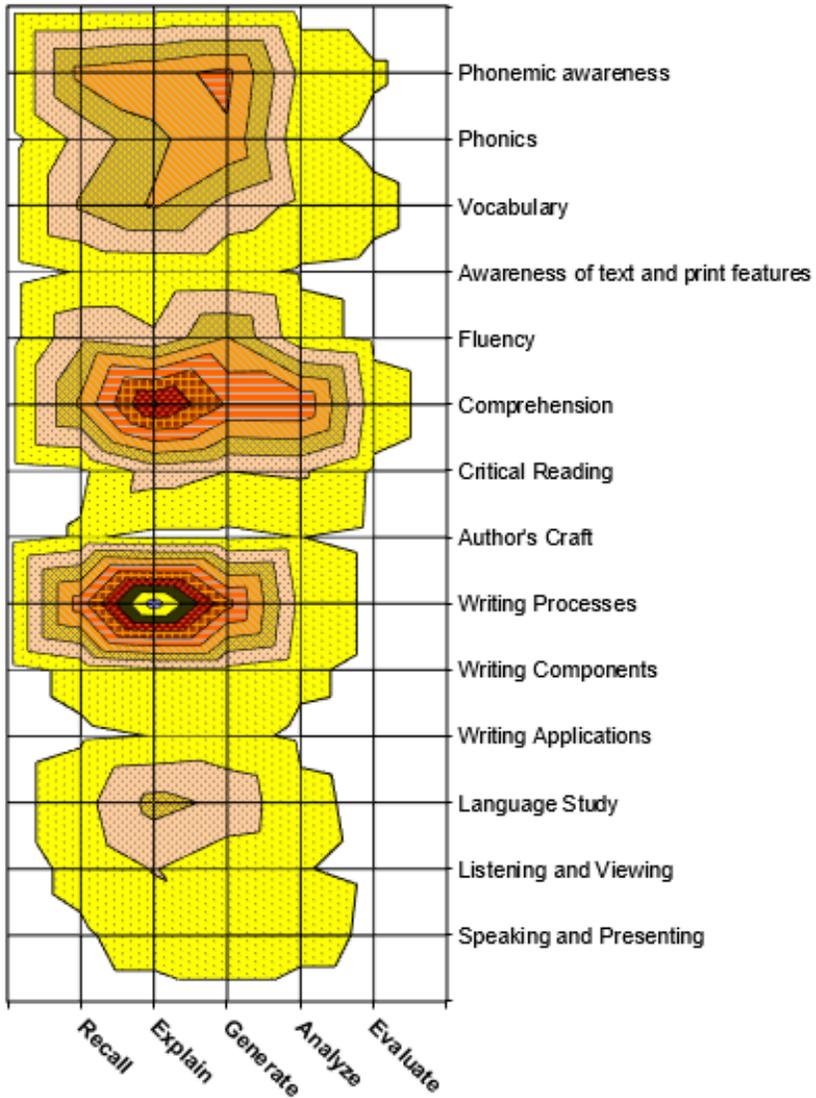
Math Book4



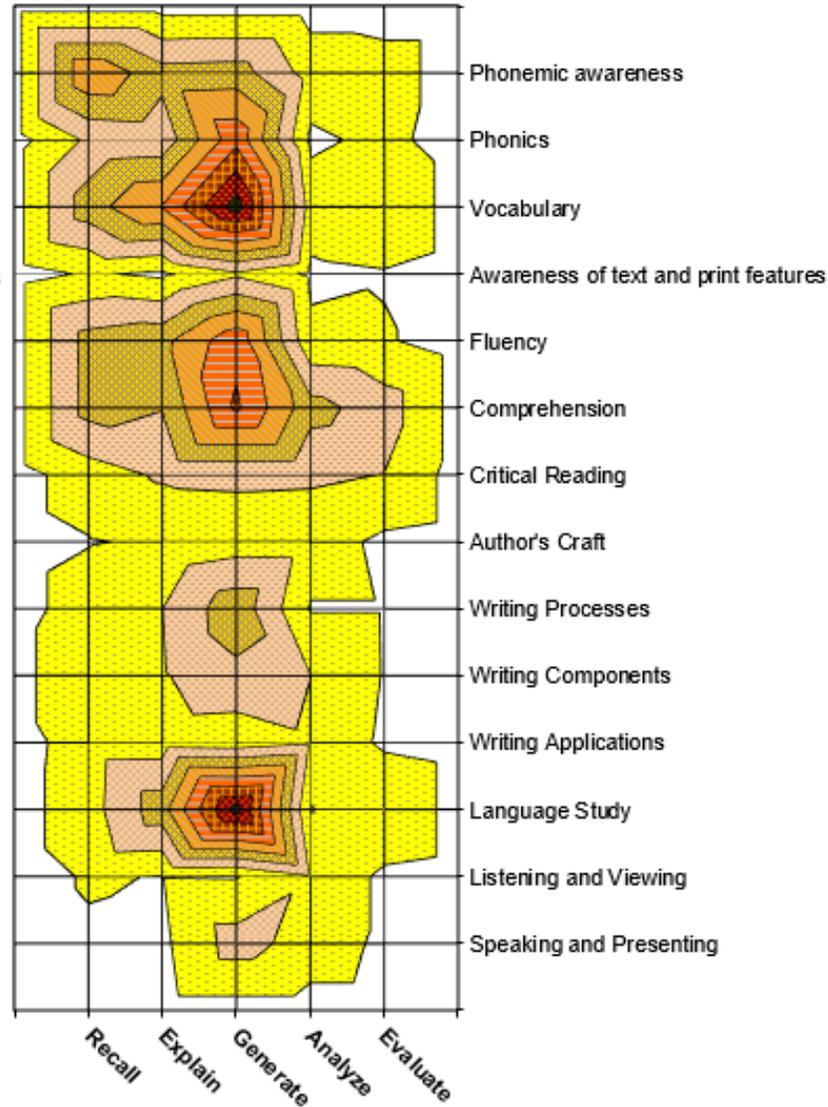
Math Book5

Progression alignment – coverage, sequence, pace

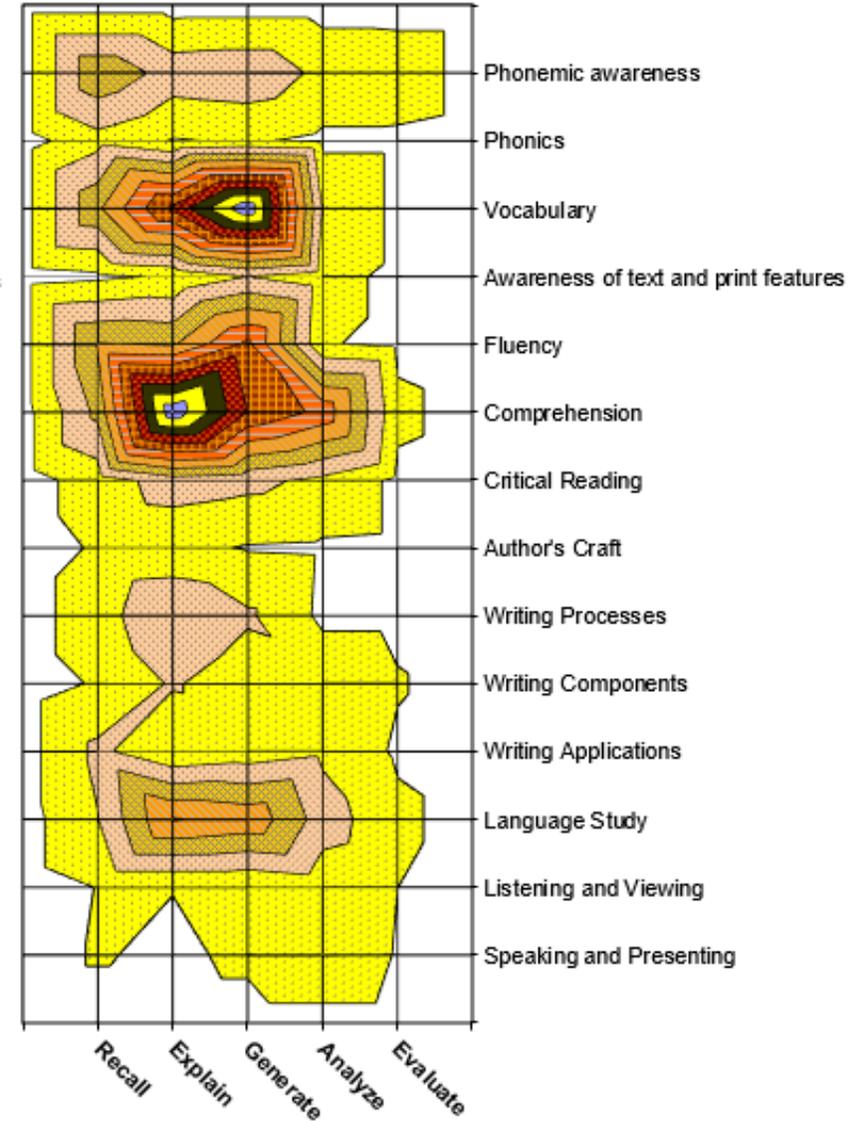
Integrated curriculum, Grade 1



Integrated curriculum, Grade 2

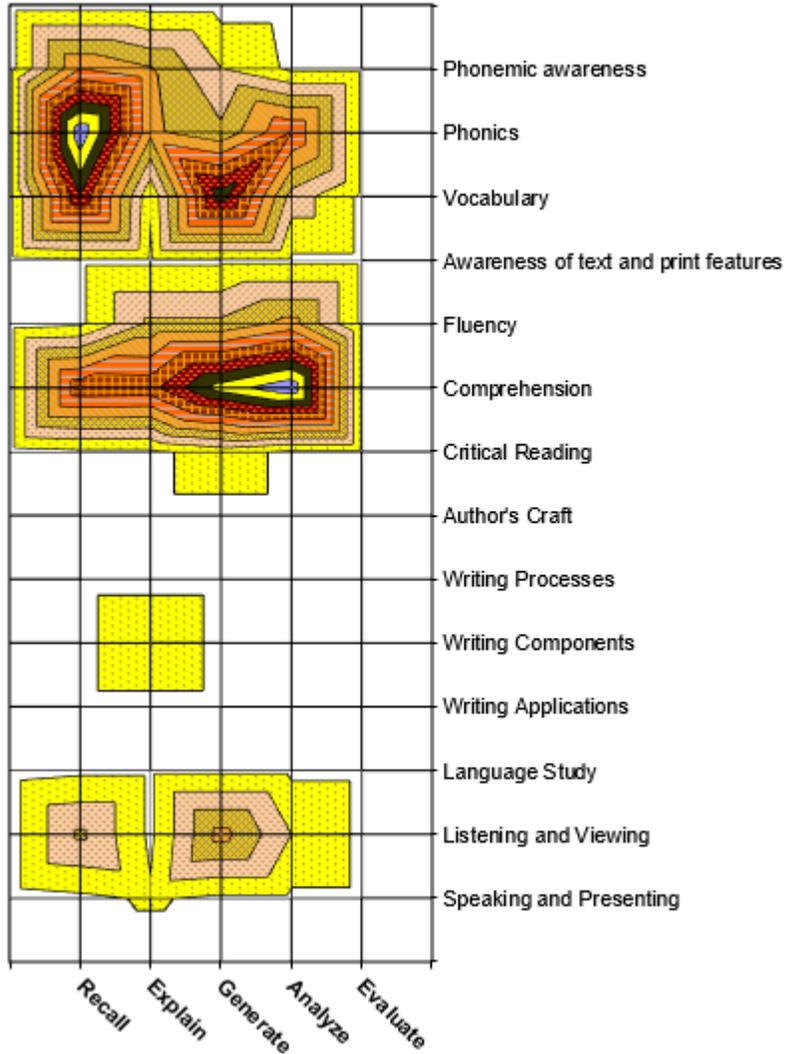


Integrated curriculum, Grade 3

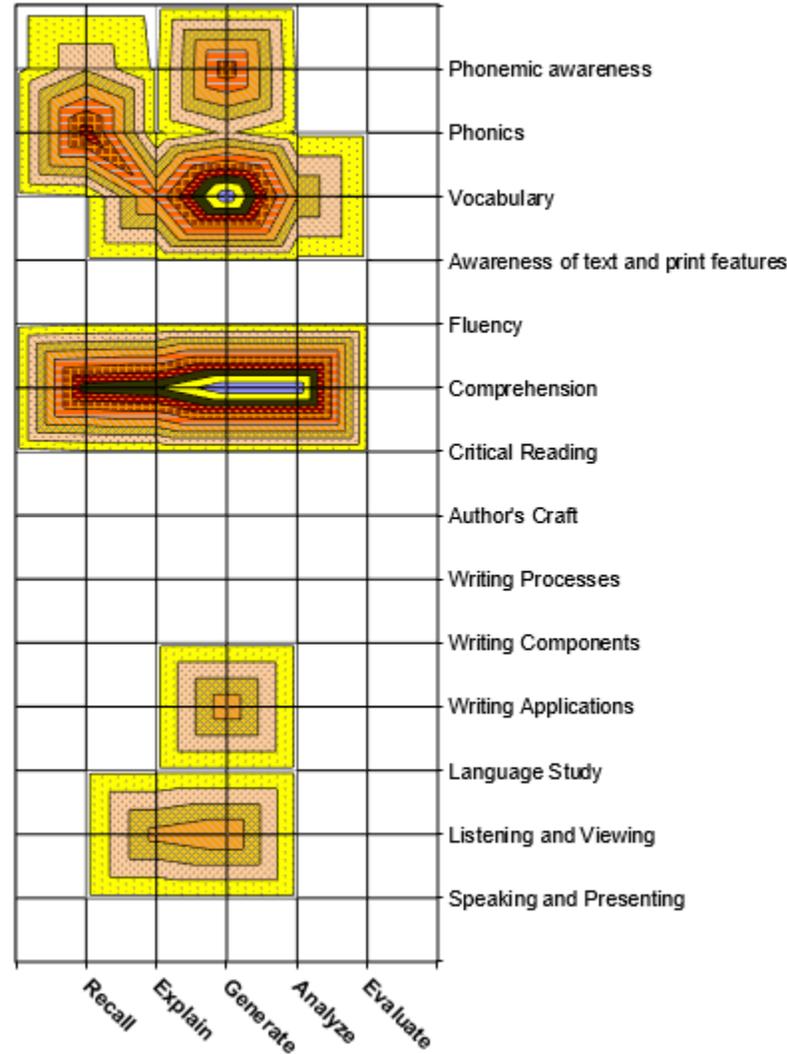


Progression alignment – coverage, sequence, pace

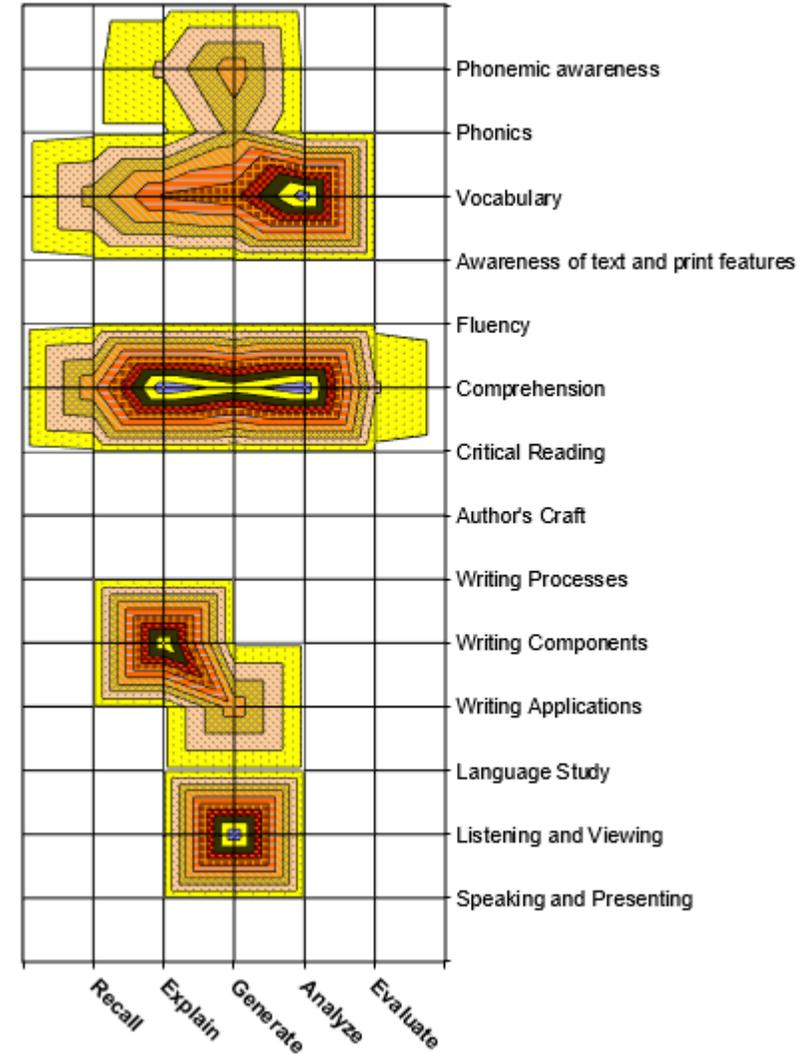
EGRA, Grade 1



EGRA, Grade 2



EGRA, Grade 3



SEC Alignment measures

	Grade / Cycle	Coarse grain alignment measures										
		S1	S2	S3	S4	S1-S4	S5	S6	S7	S5-S6	S6-S7	S5-S7
Fine grain alignment measures	S1	1.0	0.79									
	S2	0.54	1.0	0.55								
	S3		0.41	1.0	0.51							
	S4			0.38	1.0		0.65					
	S1-S4					1.0	0.61					0.66
	S5				0.38	0.34	1.0	0.60			0.64	
	S6						0.31	1.0	0.59			
	S7							0.17	1.0			
	S5-S6									1.0		
	S6-S7						0.34				1.0	
	S5-S7					0.35						1.0

Grades/ Cycles	Overall Alignment indices							
	Standards vs. Exams		Standards vs. Instruction		Standards vs. Instruction			
					Rural		Urban	
	<i>Fine</i>	<i>Coarse</i>	<i>Fine</i>	<i>Coarse</i>	<i>Fine</i>	<i>Coarse</i>	<i>Fine</i>	<i>Coarse</i>
P1-P7	0.26	0.36						
P4-P7	0.26	0.37						
P5-P7	0.36	0.52						
P6-P7	0.17	0.35						
P3			0.05	0.15	0.04	0.15	0.05	0.14
P5	0.42	0.42	0.01	0.05	0.01	0.05	0.01	0.06
P6	0.14	0.25						
P7	0.19	0.41						

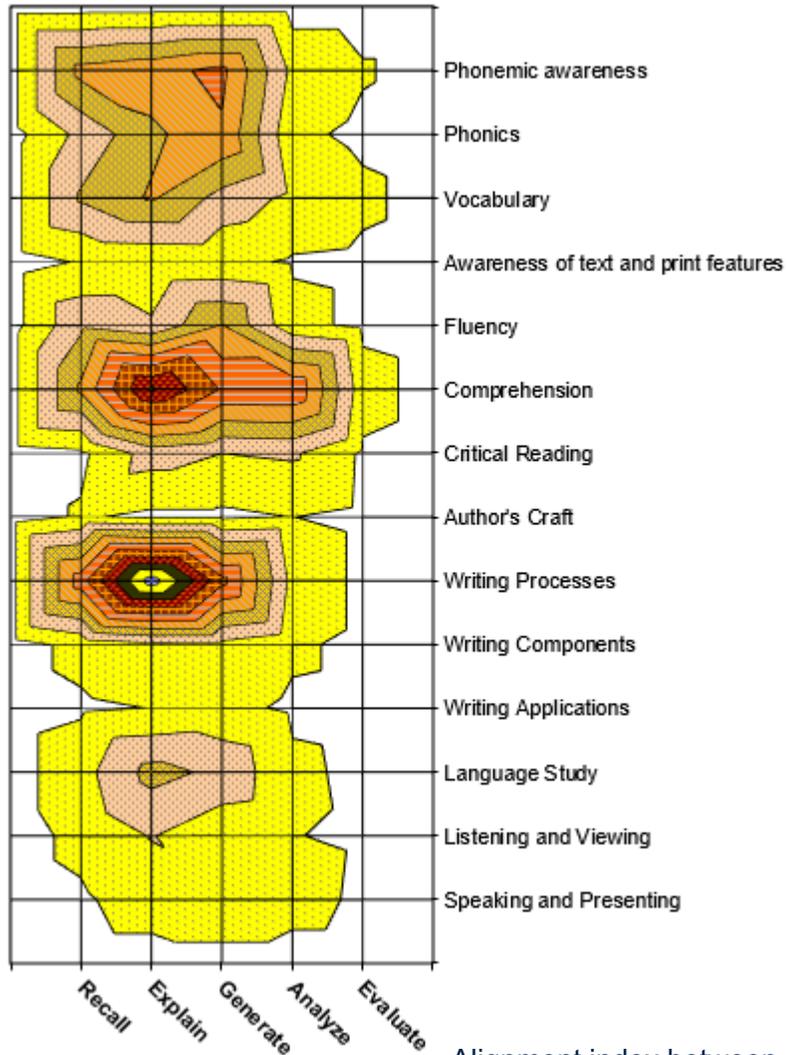
Group activity: Interpreting 3D content maps

Task: You are given two sets of 3D maps describing content embedded in subject-specific instructional components.

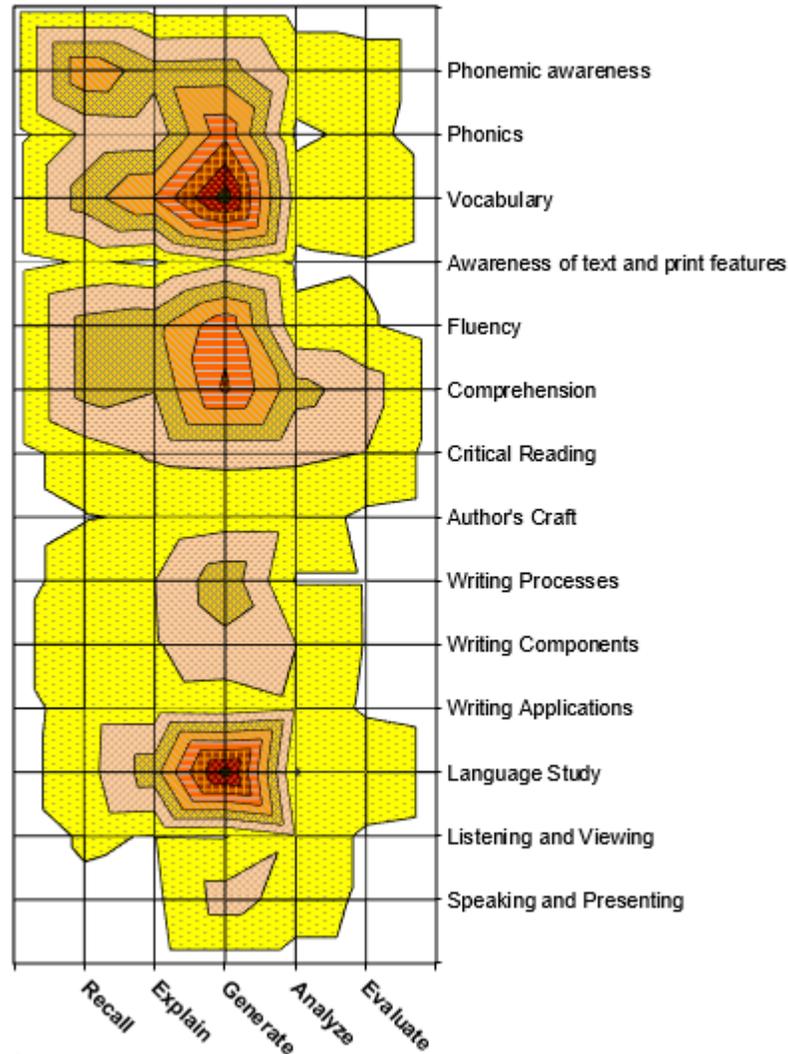
- a) Within your group, study the maps and generate within and between-component descriptions of the nature of (mis)alignments depicted.
- b) Reflecting on the (mis)alignments, describe possible policy choice(s) you would recommend to deal with any misalignments you may have unearthed.

Literacy: Within-component progression alignment

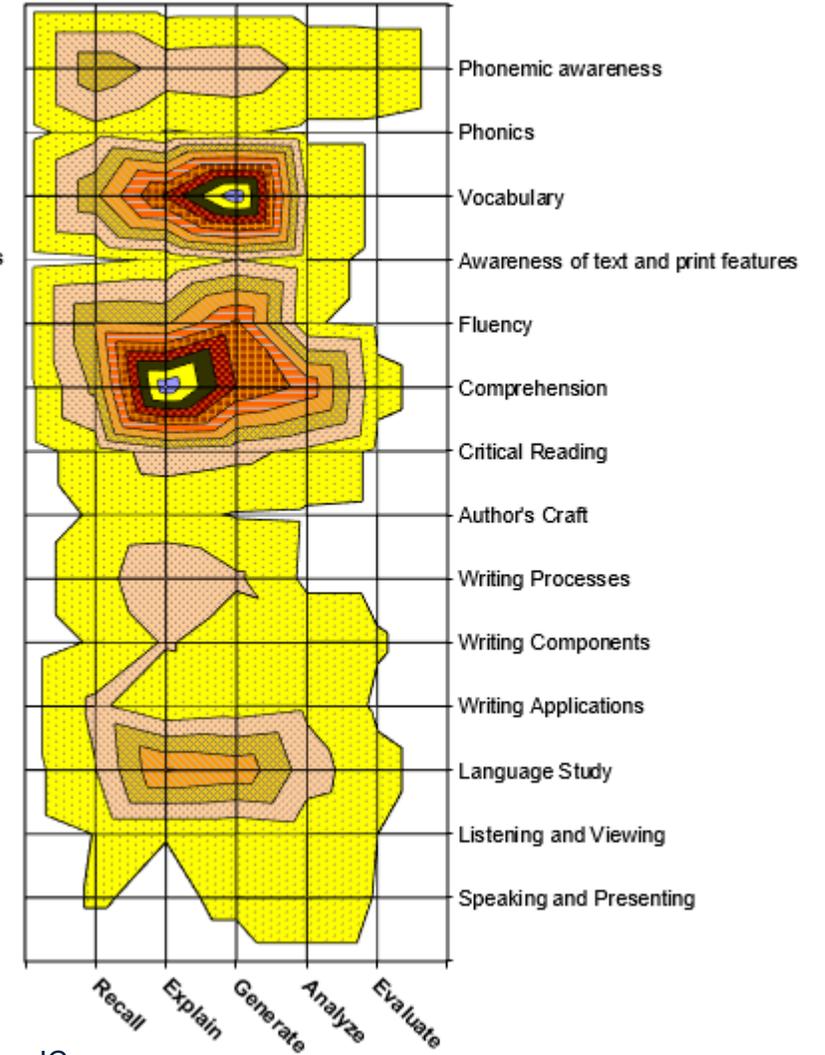
Integrated curriculum, Grade 1



Integrated curriculum, Grade 2



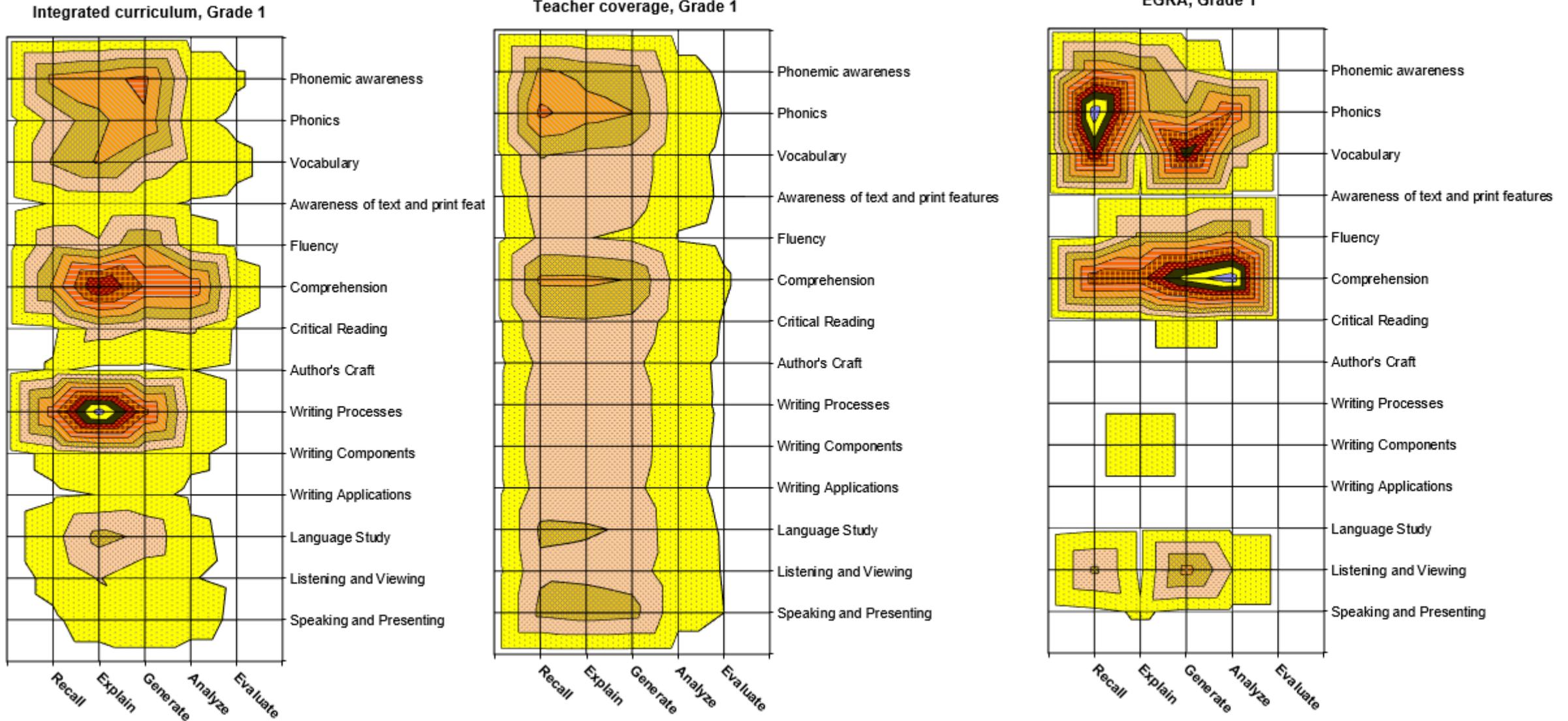
Integrated curriculum, Grade 3



Alignment index between IC grade 1 and grade 2 = 0.67

Alignment index between IC grade 2 and grade 3 = 0.73

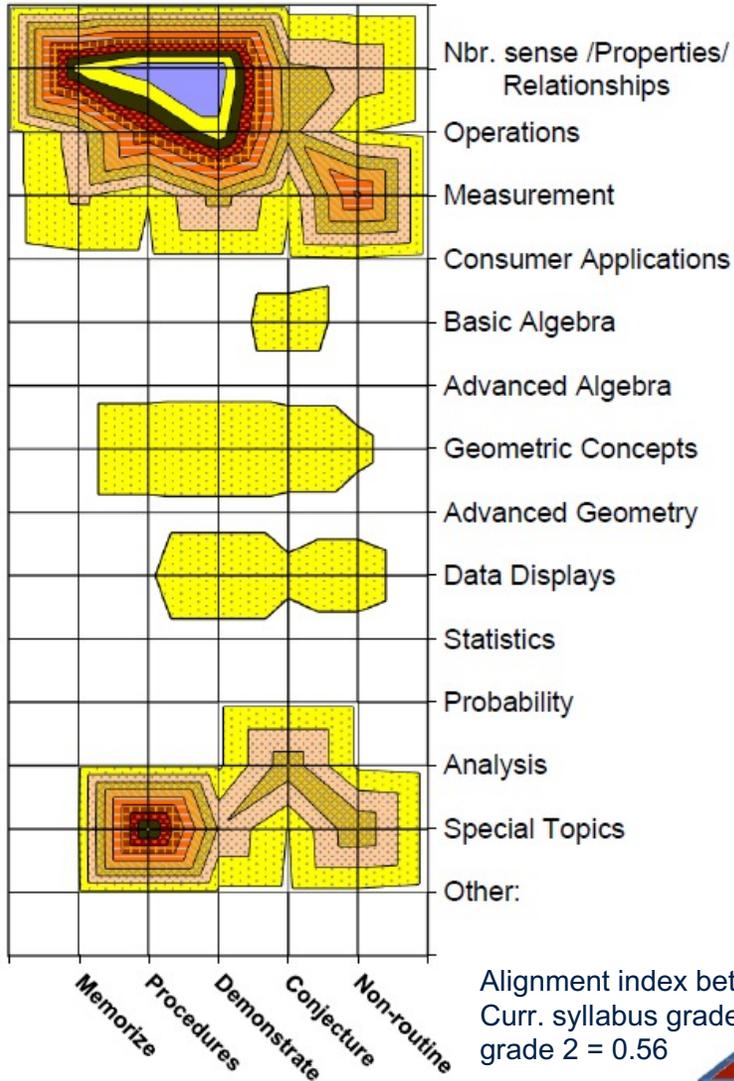
Literacy: Cross-component alignment



Alignment measures: IC vs Teacher coverage = 0.63; Teacher coverage vs. EGRA = 0.42; IC vs. EGRA = 0.47

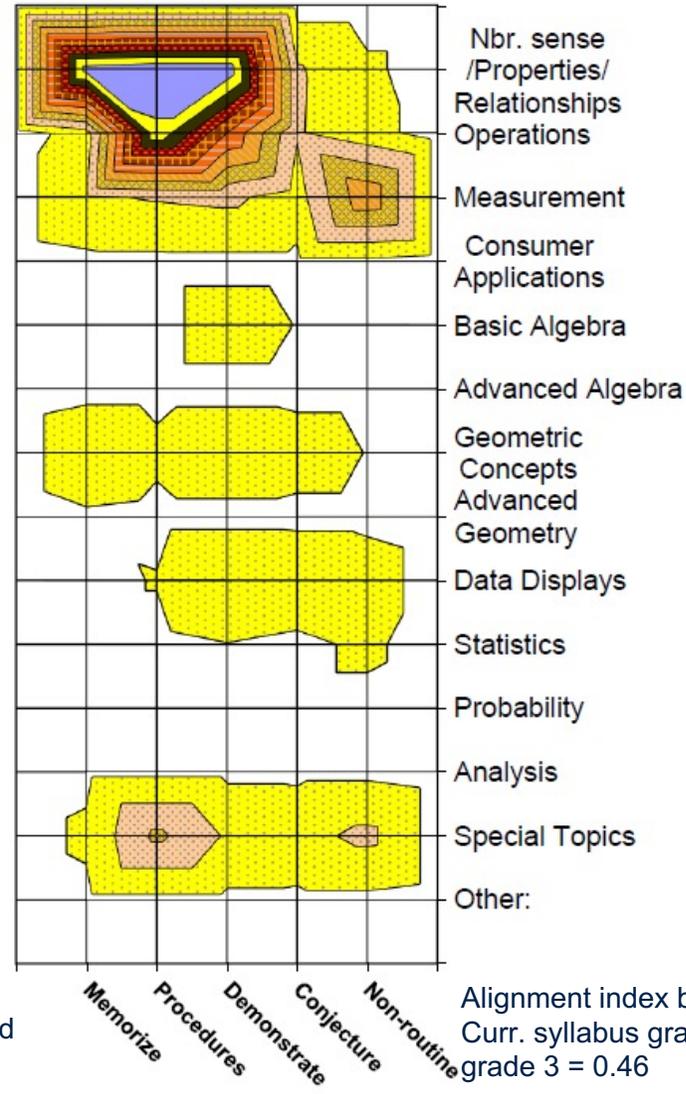
Numeracy: Within-component progression alignment

Uganda Math Primary 1
Document
All Content Areas



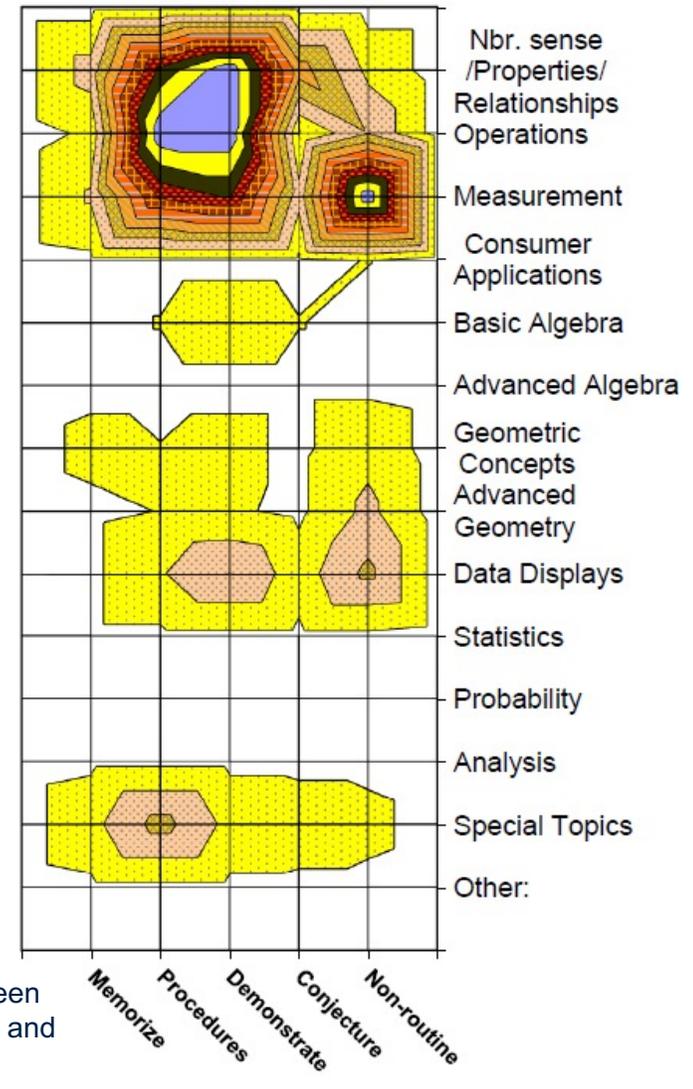
Alignment index between
Curr. syllabus grade 1 and
grade 2 = 0.56

Uganda Math Primary 2
Document
All Content Areas

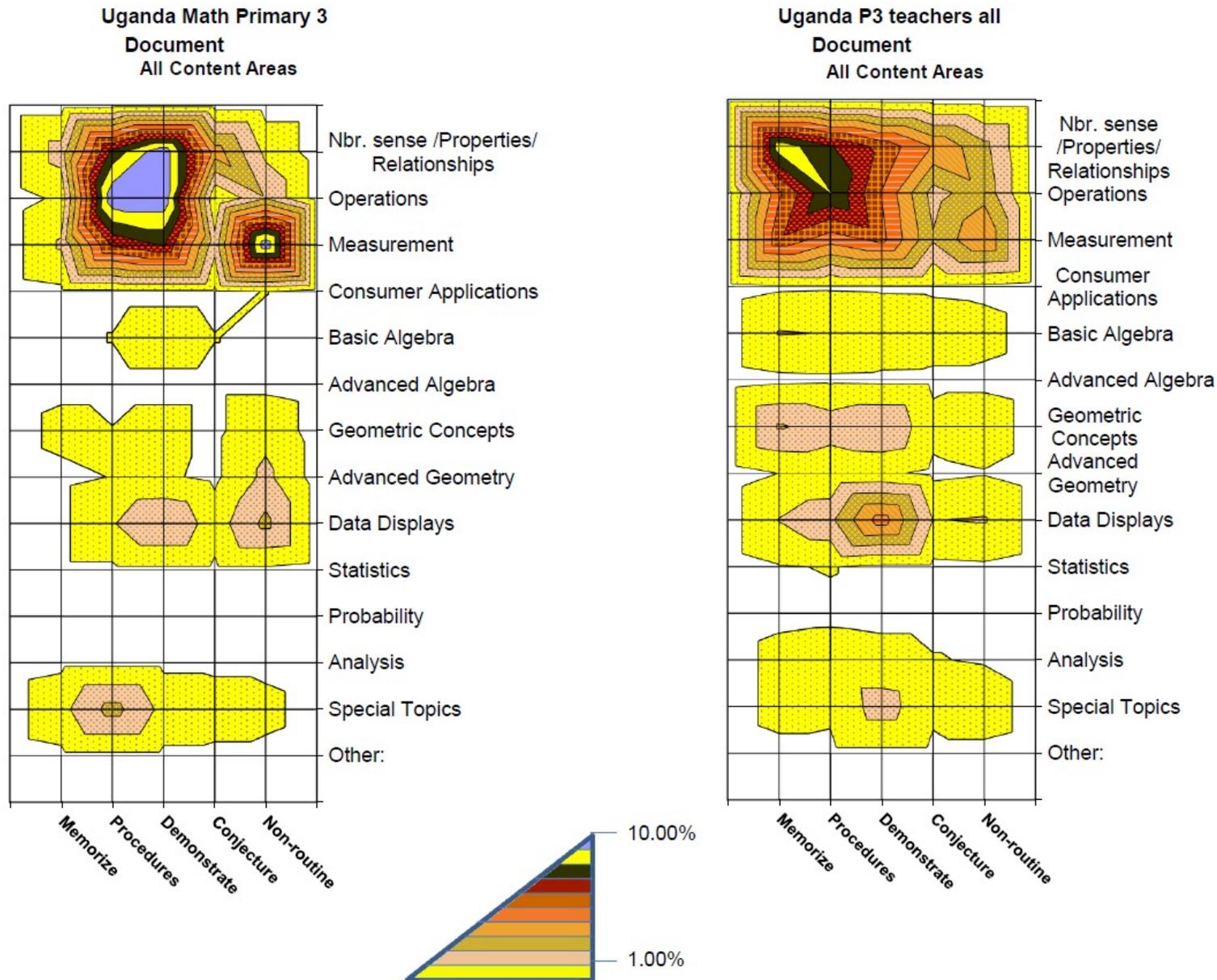


Alignment index between
Curr. syllabus grade 2 and
grade 3 = 0.46

Uganda Math Primary 3
Document
All Content Areas



Numeracy: Cross-component alignment



Alignment measure:
Grade 3 curriculum
syllabus vs Grade 3
teacher coverage = 0.38

- Subject-specific taxonomy development/adaptation: All Primary
- C & R workshops (1st individually, followed by group discussions)
- Survey of teacher instruction:
 - Facilitator training
 - Survey tools pre-testing
 - Teacher orientation on SEC (esp. the cognitive demand concept)
 - Teacher self reports of classroom content coverage

Reflections, Q&A

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