RISE
RESEARCH ON IMPROVING SYSTEMS OF EDUCATION

System (in)coherence

Quantifying the alignment of primary education curriculum standards, examinations, and instruction in two East African countries

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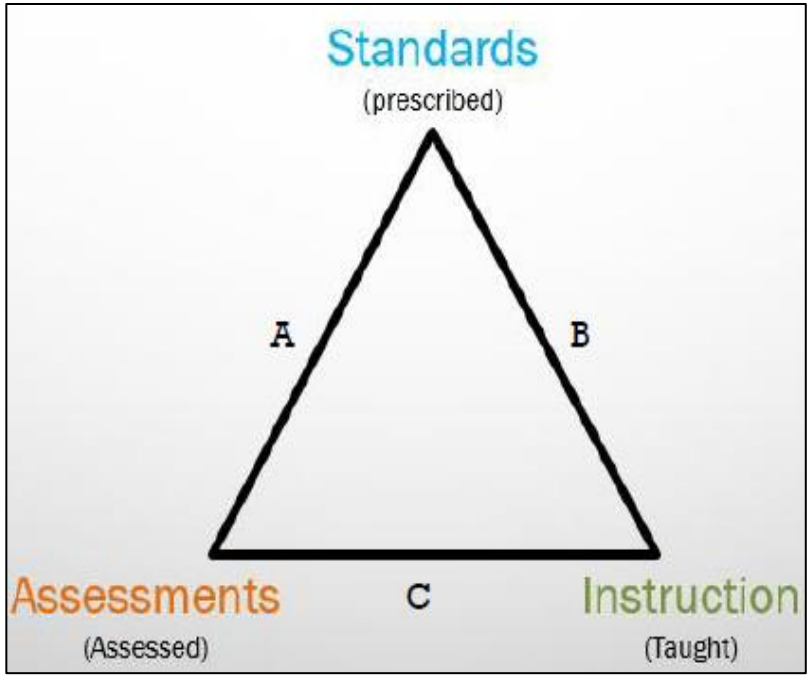
Instructional coherence

- Instructional alignment is important for learning
  - e.g. Alignment of curriculum, materials, assessments, support, instruction
  - (Crouch and DeStefano, 2017; Piper et al., 2018; Banerjee et al., 2016; Crouch, 2020; Smithson and Collares, 2007; Gamoran et al., 1997; Porter, 2002)

- Teachers have many responsibilities – which may compete or be contradictory (Porter, 2002; Pritchett, 2015)
  - Completing the curriculum, preparing children for exams, ensuring children acquire the desired competences, among others.

Triangle of relationships for instructional alignment



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Instructional coherence through a systems lens

- The RISE systems framework characterizes the system through four relationships of accountability and five design elements
- Teachers may be **delegated** different tasks by different actors (curriculum body, exams body, parents) (B1 and B2 in figure)
- Teachers may or may not be adequately **supported** to perform tasks (A1, A2, A3)

Figure 1. Education systems framework of accountability

Five design elements	Principal-agent relationships of accountability			
	Politics (Citizens to Executive Authority)	Compact (Executive Authority to Education Authorities)	Management (Education Authorities to Front-line providers)	Voice/ Client power (Citizens to Front-line providers)
Delegation			A_1, B_1	B_2
Finance				
Support			A_2	
Information			A_3	
Motivation				

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Instructional coherence

- Instructional components may be incoherent with each other, and/or incoherent for learning
  - Separate agencies + poor coordination in development of curriculum and exams (GoU, 1973; GoU, 1983; World Bank, 2012; Munene, 2017; GoT, 1973; GoT, 1975; MoEST, 2018)
  - Overambitious curriculum (Pritchett & Beatty, 2012)
  - Exams poorly designed or designed for selection (Allen et al., 2016; Burdett, 2016)

- How to measure instructional coherence and diagnose incoherence?
  - This presentation will illustrate a tool for diagnosing and exposing systemic challenges to improving learning at scale

Surveys of Enacted Curriculum (SEC)

- Tools for academic content analysis, alignment analysis, teacher support (Blank, Porter, & Smithson, 2001; Smithson, 2013)
  - Facilitates teacher reflection and professional development and education content reform

- Systematically analyze and quantify the content and coherence of primary curriculum standards, national exams, and teacher instructional content in Uganda and Tanzania.

- Implementation through partnership between Twaweza East Africa and Wisconsin Center for Educational Research/Center for Curriculum Analysis.

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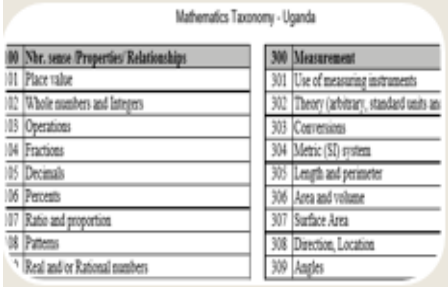
Surveys of Enacted Curriculum (SEC)

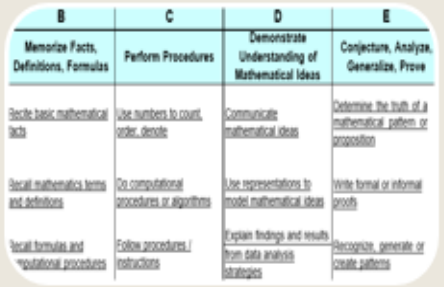
SEC inputs – outputs


Mathematics Taxonomy - Uganda

100	Nbr. sense /Properties/ Relationships
101	Place value
102	Whole numbers and Integers
103	Operations
104	Fractions
105	Decimals
106	Percents
107	Ratio and proportion
108	Patterns
	Real and/or Rational numbers

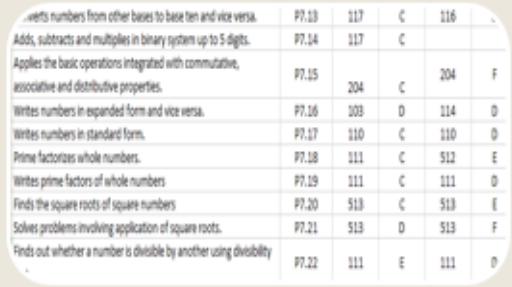
300	Measurement
301	Use of measuring instruments
302	Theory (arbitrary, standard units an
303	Conversions
304	Metric (SI) system
305	Length and perimeter
306	Area and volume
307	Surface Area
308	Direction, Location
309	Angles

Taxonomy of topics/subtopics



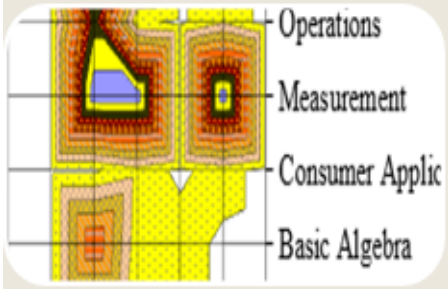
B	C	D	E
Memorize Facts, Definitions, Formulas	Perform Procedures	Demonstrate Understanding of Mathematical Ideas	Conjecture, Analyze, Generalize, Prove
Recite basic mathematical facts	Use numbers to count, order, denote	Communicate mathematical ideas	Determine the truth of a mathematical pattern or proposition
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

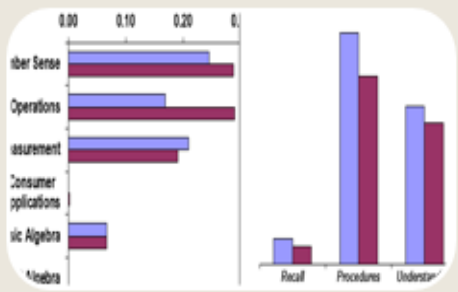


verts numbers from other bases to base ten and vice versa.	P7.13	117	C	116	
Adds, subtracts and multiplies in binary system up to 5 digits.	P7.14	117	C		
Applies the basic operations integrated with commutative, associative and distributive properties.	P7.15	204	C	204	F
Writes numbers in expanded form 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

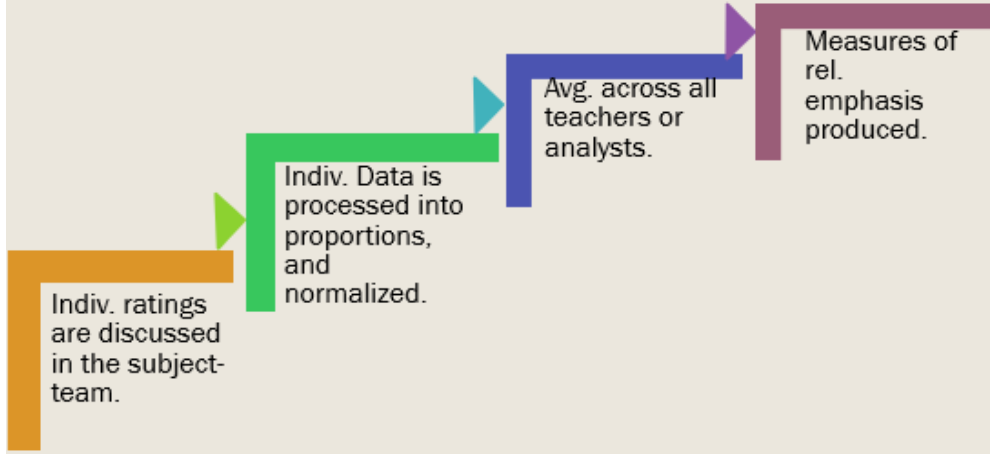


User-friendly marginal charts

rimary 5 teachers all	Alignment	Balance of Representation	Categorical Concurrence	Cognitive Complexity
lumber 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
er Applications	0.00	0.00	0.00	0.15
Basic Algebra	0.22	0.01	0.41	0.71

Alignment tables & indices

SEC data analysis & processing



- Analysis results reported as alignment indices on a 0 – 1 scale

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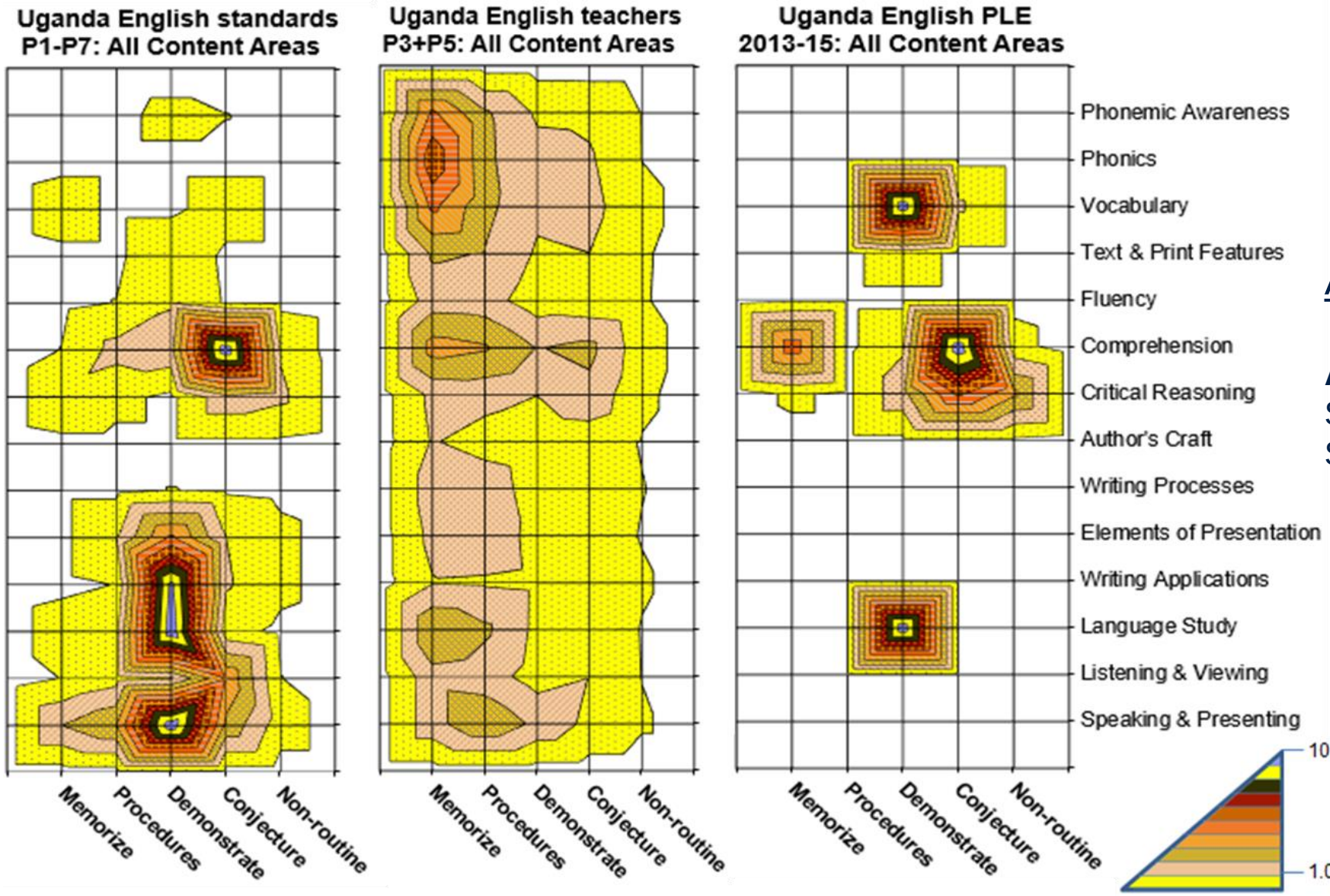
Primary English in Uganda



Across components

Alignment measures:
Standards vs. Exams 0.36
Standards vs. Instruction 0.34

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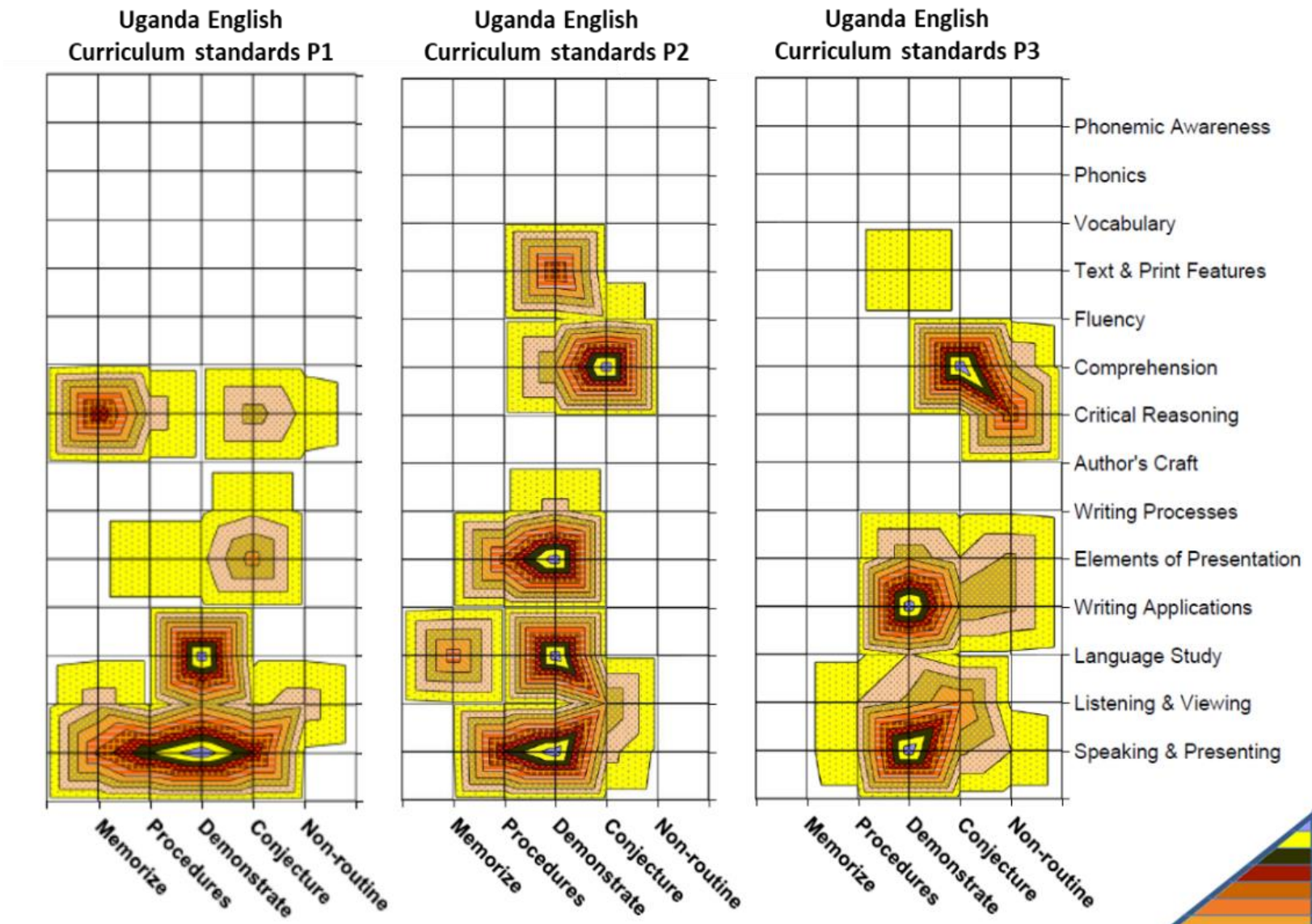
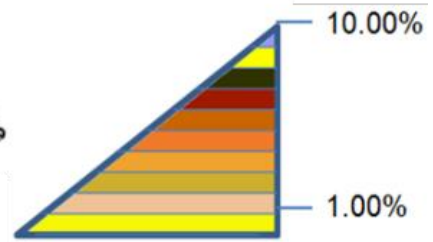
Primary 1 - 3 English Curriculum Standards in Uganda



Within a component

- Non-systematic articulation.
- Skip-and-reinstate coverage pattern, sometimes with cognitive leaps: critical reading, writing applications.
- Omits foundational literacy skills like phonemic awareness, phonics and vocabulary



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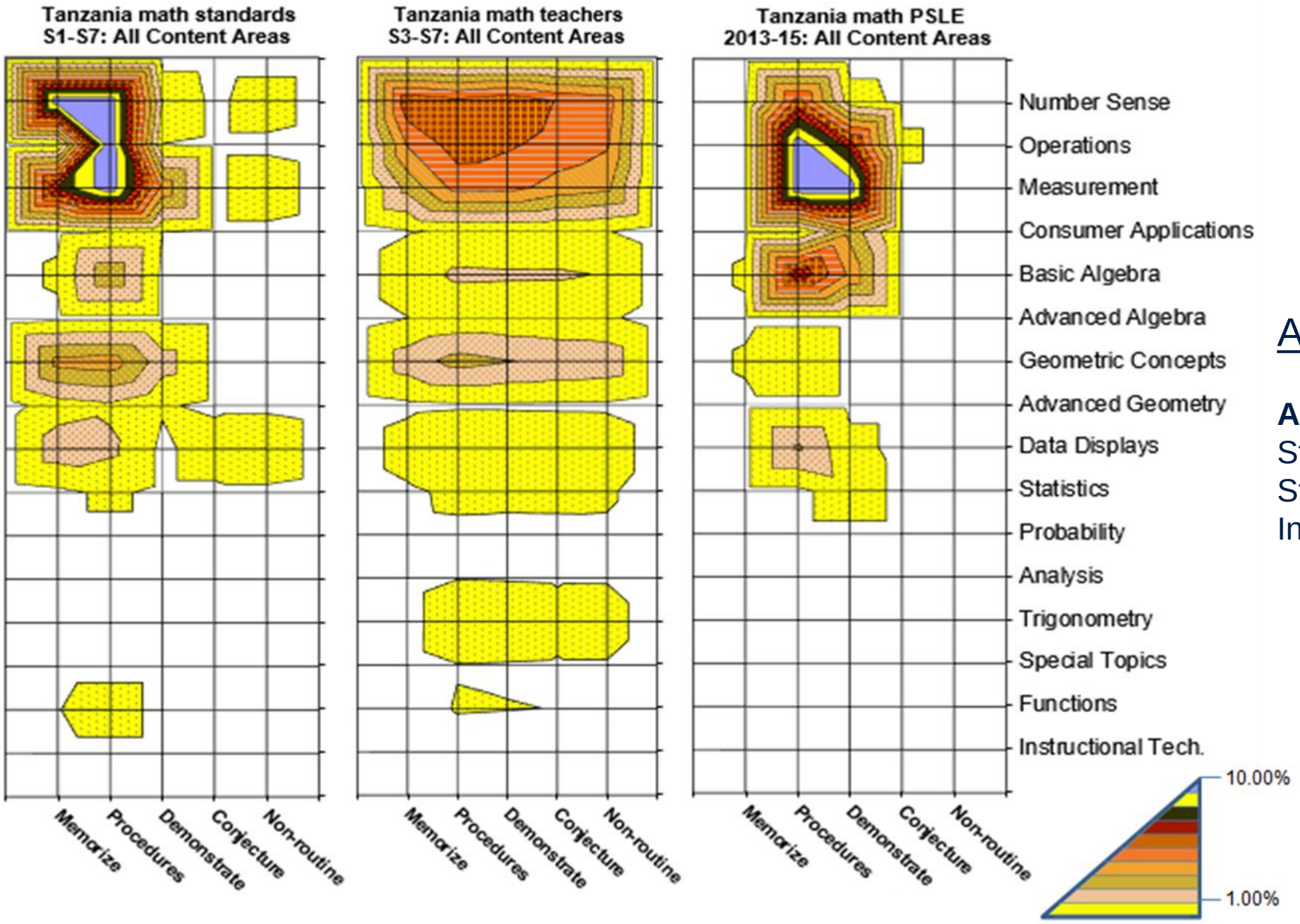
Primary Math in Tanzania



Across components

Alignment measures:
Standards vs. Exams 0.44
Standards vs. Instruction 0.44
Instruction vs. Exams 0.33

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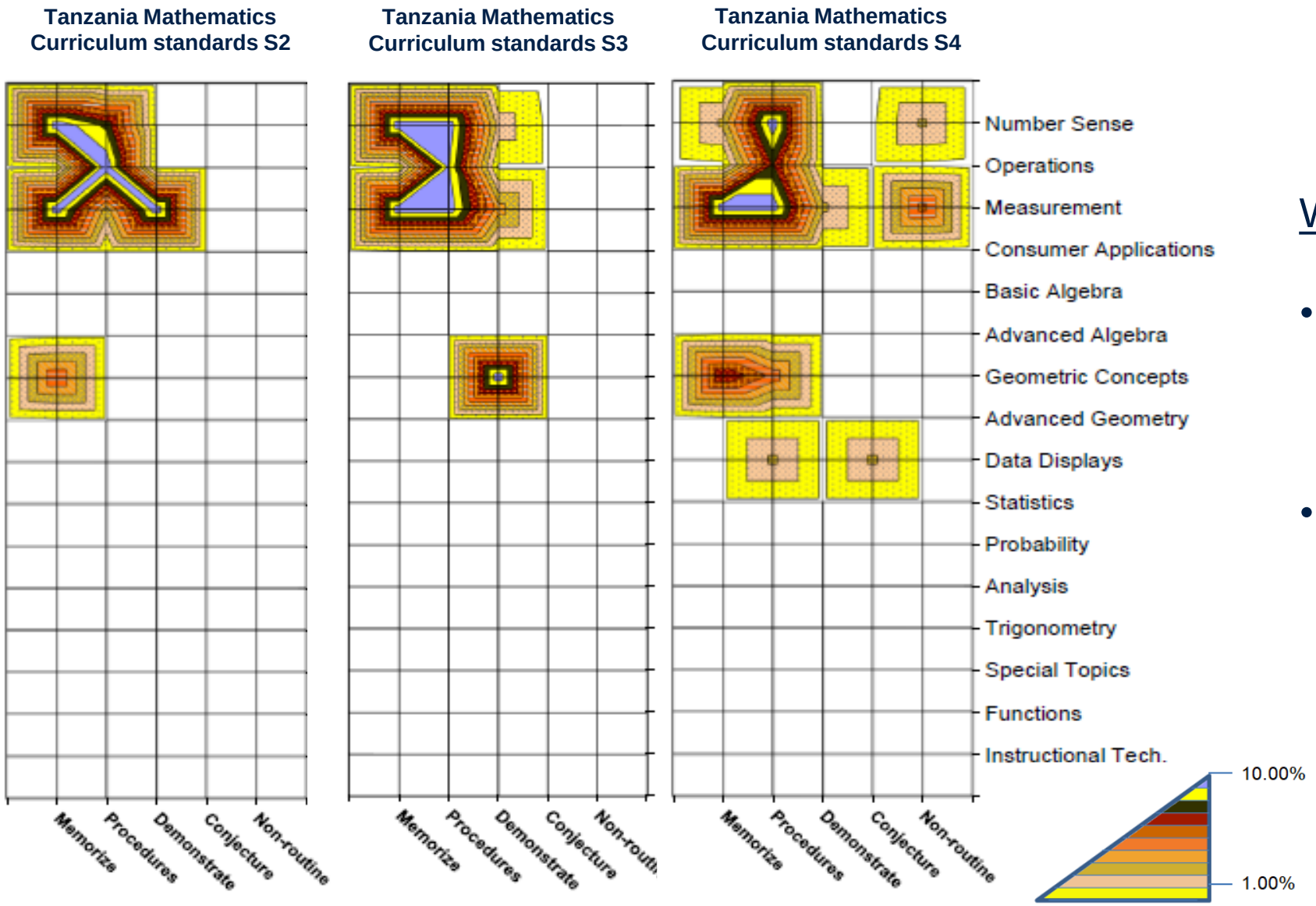
Primary 2 - 4 Mathematics Curriculum Standards in Tanzania



Within a component

- Covers foundational skills in early years
- Extends level of cognitive demand in Standard 4

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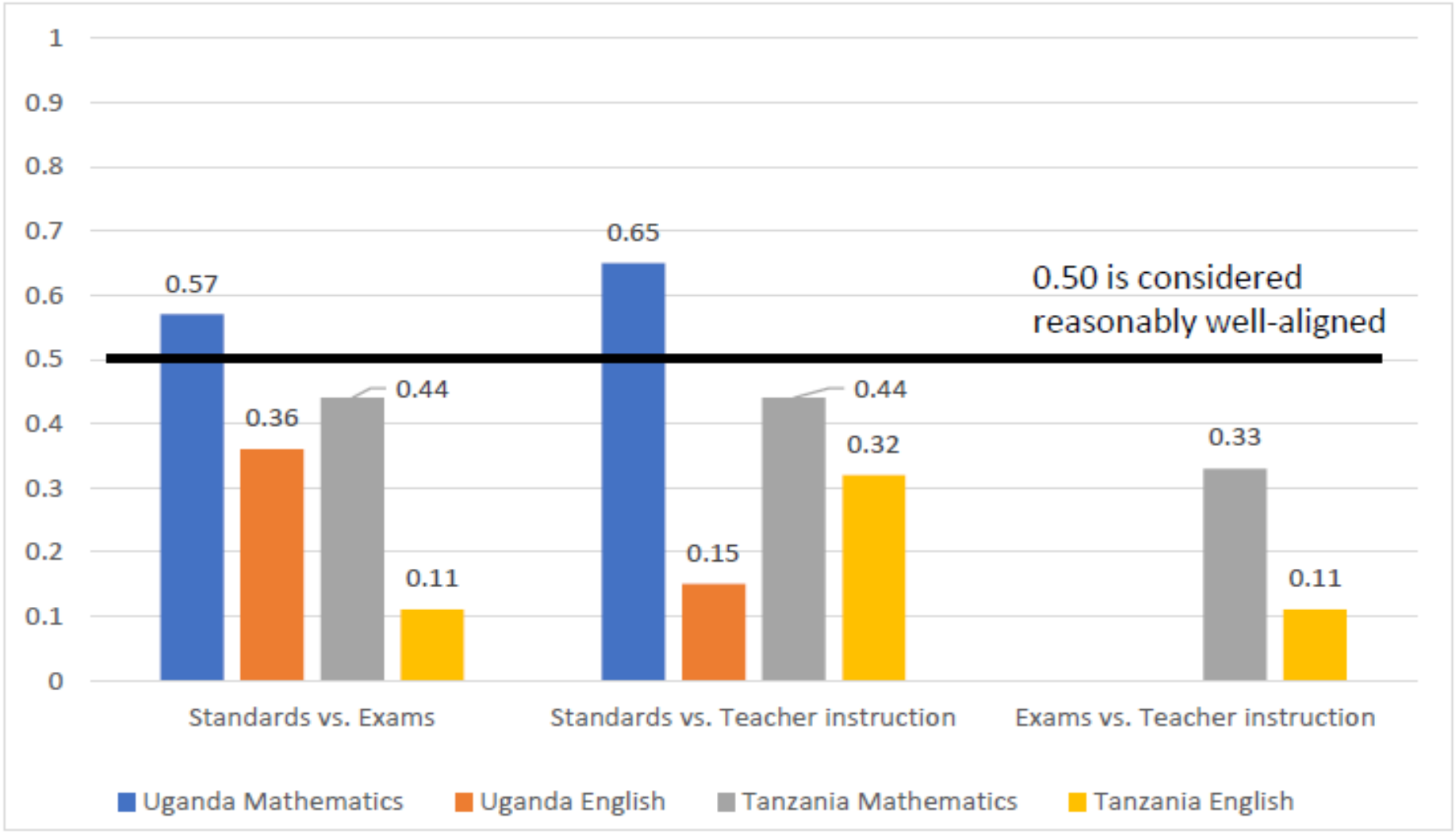
Alignment measures: Mathematics and English in Uganda and Tanzania



Summary

- Low alignment measures across the three instructional components.
- Non-systematic articulation of curricular content across grades & cycles in the standards.
- Teachers tending to cover broad swathes of content and cognitive demand levels, not well aligned with curriculum standards nor exams.
- Internally well aligned national exams, with a tendency to over (under)-emphasize certain content areas – decreasing alignment with the curriculum standards.

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Summary

- Our findings from Uganda and Tanzania suggest education system components that may be constraining efforts to improve learning at scale.

- Future work: alignment analyses in other developing country contexts, other aspects of SEC (peer-level teacher reflections, teacher prof. development, OTL analyses, etc.)

- Rather than taking a *normative stance* on what coverage *should* look like, SEC offers a *positive diagnosis* of what coverage *does* look like – descriptions of "what is". SEC can be used by relevant education experts to inform content reforms.

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