Re-thinking curriculum for the 21st century skills: **Results and role of content analysis in evaluating curriculum effectiveness**

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Presentation Layout

• Justification for the study
• Study objectives
• Methodology
• The findings and discussions
• Policy implications
Study justification

- In 2015, government initiated curriculum reform in Kenya. Reform envisions learners equipped with world class knowledge and skills in order to thrive in the 21st century (KICD, 2016)
- The reform identifies, among others,
  - A visionary and sustainable curriculum providing every learner with seamless, competency based high quality learning
  - A curriculum that leads to improved learning outcomes and subsequent attainment of the 21st century skills for all children in Kenya (KICD, 2016)
- Studies reveal low competency gains (Uwezo, 2010-2016; KNEC, 2016)
- Inadequate evidence on the effectiveness of the curriculum – right content, with sufficient quality and depth, in its formulation and instruction, to effectively yield high achievement levels
- **Content is crucial;** Curriculum content should meet the current and long term competency needs of its learners and the state goals on education (NRC, 2004).
Study objectives

1. To describe the English and Mathematics academic content in three dimensions;
   • What learners should know (topics and subtopics)
   • What learners should be able to do (performance/cognitive expectations)
   • Relative emphasis of topics and performance expectations

2. To diagnose areas of improvement and alignment with the national goals on curriculum development/reform
Study methodology

• **Curriculum Content Analysis approach**: identifies the most important concepts to be learned; to understand the transmission of the skills implied in curriculum; to guide instruction

• Adopts the Survey of Enacted Curriculum (SEC) model (Andrew C. Porter and John Smithson, University of Wisconsin, USA)
  • The most predictive model of student achievement; the only model that provides alignment indices at the level of the enacted, taught and assessed curriculum level (Case & Jorgensen, 2004)

• Analysis focused on English and Mathematics syllabus (KIE, 2002 version), at primary level

• Conducted by a broadly representative team of subject experts; three for each subject; sufficiently trained on the methodology
Methodology

1. Adopts the five SEC categories of performance expectations (drawn from Blooms taxonomy)

Low

B – Memorize or Recall
C – Perform or explain procedures
D – Communicate ideas / demonstrate understanding
E – Analyze/ Investigate or proof
F – Evaluate/Synthesis / novel thinking

High
## 2. Developed coded taxonomies

### PRIMARY MATHEMATICS TAXONOMY

<table>
<thead>
<tr>
<th>CODE</th>
<th>TOPICS</th>
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<th>TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>NUMBERS</td>
<td>600</td>
<td>GEOMETRY</td>
</tr>
<tr>
<td>200</td>
<td>FRACTIONS</td>
<td>700</td>
<td>ALGEBRA</td>
</tr>
<tr>
<td>300</td>
<td>DECIMALS &amp; PERCENTAGE</td>
<td>800</td>
<td>TABLES AND GRAPHS</td>
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<tr>
<td>400</td>
<td>OPERATIONS ON NUMBERS</td>
<td>900</td>
<td>SCALE DRAWING</td>
</tr>
<tr>
<td>500</td>
<td>MEASUREMENT</td>
<td>1000</td>
<td>RATIO AND PROPORTION</td>
</tr>
<tr>
<td>200</td>
<td>FRACTIONS</td>
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<tr>
<td>500</td>
<td>MEASUREMENT</td>
<td>1000</td>
<td>RATIO AND PROPORTION</td>
</tr>
</tbody>
</table>

### PRIMARY ENGLISH LANGUAGE TAXONOMY

<table>
<thead>
<tr>
<th>CODE</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Listening/Viewing/Phonemic awareness</td>
</tr>
<tr>
<td>200</td>
<td>Speaking/Presenting</td>
</tr>
<tr>
<td>300</td>
<td>Reading</td>
</tr>
<tr>
<td>400</td>
<td>Writing</td>
</tr>
</tbody>
</table>
Up to the subtopic level of detail ..... 

<table>
<thead>
<tr>
<th>TOPIC CODES</th>
<th>TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>NUMBERS</td>
</tr>
<tr>
<td>101</td>
<td>Pre-number activities</td>
</tr>
<tr>
<td>102</td>
<td>Counting</td>
</tr>
<tr>
<td>103</td>
<td>Reading and writing numbers in symbols</td>
</tr>
<tr>
<td>104</td>
<td>Reading and writing numbers in words</td>
</tr>
<tr>
<td>105</td>
<td>Place value and total value</td>
</tr>
<tr>
<td>106</td>
<td>Multiples and factors of numbers, LCM /HCF and Greatest Common Divisor of numbers</td>
</tr>
<tr>
<td>107</td>
<td>Divisibility tests</td>
</tr>
<tr>
<td>108</td>
<td>Odd, Even and Prime numbers</td>
</tr>
<tr>
<td>109</td>
<td>Rounding of numbers</td>
</tr>
<tr>
<td>110</td>
<td>Squares and square roots</td>
</tr>
<tr>
<td>200</td>
<td>FRACTIONS</td>
</tr>
<tr>
<td>201</td>
<td>Fraction as part of a whole and part of a group, reading and writing fractions</td>
</tr>
<tr>
<td>202</td>
<td>Comparing and simplifying fractions</td>
</tr>
<tr>
<td>203</td>
<td>Types of fractions (proper, improper and mixed fractions) and conversion of fractions</td>
</tr>
<tr>
<td>204</td>
<td>Operation of fractions (addition, subtraction, multiplication and division)</td>
</tr>
</tbody>
</table>
3. Qualitative, independent description of the syllabus objectives:

- Each analyst assigned a sub-topic code and performance expectation code that appropriately describes each learning objective.
- Where a learning objective addressed more than one topic and cognitive expectation - the analysts recorded all the topics and cognitive categories.
- For example: Learning objective: Be able to count numbers from 1 up to 99. Codes 102B, 102C;
Methodology

4. Team discussions around the rationale used to justify their descriptions of content
   - Consensus was not required. The goal was to ensure that the analysts had similar understanding of the analysis procedures, which improves the validity of results.
   - Allowed for modification of description

5. Quantitative analysis: the descriptions were averaged using Excel software to produce descriptive and interactive results
The Findings...

Objective 1: Description of academic content:
  ✓ Relative emphasis on topics (what students should know)
  ✓ Relative emphasis on performance expectations (be able to do)

Objective 2: What areas should we improve or align with the goals on curriculum reform?
Math content: early grade (Class 1-3)

- Topic ‘numbers’ most emphasized in Class 1, drops in 2 & 3
- Increasingly complex tasks: recognize, count, read, write in symbols and words up to
  - 2 digit numbers (99), in Std1. Add and subtract
  - 3 digit numbers (999) in Std 2; +, -, ×, ÷, without carrying
  - 4 digits (9999) in Std3. +, -, ×, ÷ with and without carrying
- ‘measurements’ in class 3 (length, mass, capacity, money, time)
Math content: mid primary (Class 4-6)

- Nine topics at mid primary
- ‘Measurements’ mostly emphasized (length, mass, capacity, money, time, perimeter, area, volume)
Math content: upper primary (Class 7-8)

• Ten topic areas in upper primary
• Consistent with LTMF report 2013: *Towards Universal Learning; What every child should learn* (UNESCO&CUE,2013)
• However, recommends consideration of country specific contexts
• Which key mathematical concepts should we focus on in early grade? Mid and upper levels?
What do we expect pupils to be able to do with Math?

“A mile wide and an inch deep....”
English content: early grade (Class 1-3)

- More emphasis on expressive skills ‘writing’ and ‘speaking/presenting’ in early and mid grade
- Less emphasis on receptive skills ‘listening, viewing & phonemic awareness’ and ‘reading’
English content: mid primary (Grade 4-6)

Relative emphasis: All topics

- **Listening/Viewing/Phonemic Awareness**
  - Eng - Std4
  - Eng - Std5
  - Eng - Std6

- **Speaking/Presenting**
  - Eng - Std4
  - Eng - Std5
  - Eng - Std6

- **Reading/Comprehension**
  - Eng - Std4
  - Eng - Std5
  - Eng - Std6

- **Writing**
  - Eng - Std4
  - Eng - Std5
  - Eng - Std6

Bar chart showing the relative emphasis of different topics in English education from Grade 4 to Grade 6.
English content: upper primary (class 7-8)

- Even when writing, more emphasis is on ‘answering written questions’ in all grade levels.
What do we expect pupils to be able to do with English Language?

Endeavors to demonstrate masterly of language skills
Policy implications

1. **Math**: sustain emphasis on the topic ‘Numbers’ and ‘Operations’ in early grades in order to ensure sound masterly of concepts to sufficient depth to support future learning.

2. **English**: emphasize on ‘Listening’, ‘phonemic awareness’ and ‘speaking’ in early grade in order to facilitate acquisition of the more complex reading and writing skills.

3. **Appropriate emphasis** on cognitive skills across all grades – in readiness for 21st century skills (critical and analytical thinkers, problem solver, innovators - all are manifestations of higher order thinking)

4. Develop benchmarks on acceptable level of relative emphasis of topics and cognitive expectations - to guide curriculum design, teacher professional development and instructional delivery
References

5. UNESCO & CUE 2013. Towards Universal Learning; What every child should learn.