An Analysis of Low students performance in the FTNA Basic Mathematics: Evidence from SIRA reports

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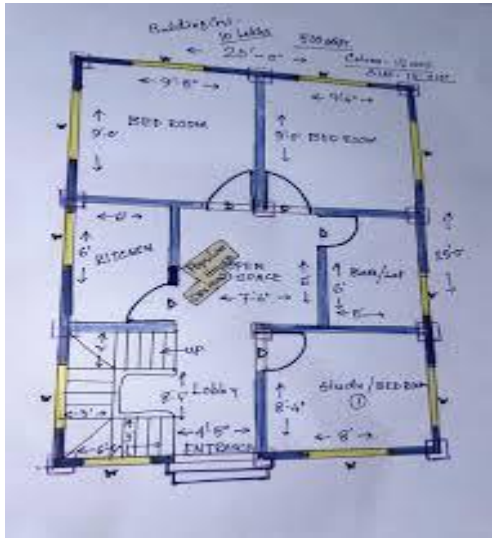
Presentation Outline

- Introduction
- Background to the problem
- Study Approach
- Data Analysis
- Key findings
- Conclusion

Introduction

- **Mathematics is one of the most important subjects as it promotes essential skills such as critical thinking, problem solving and logical reasoning and decision making.**
- **The subject provides the language and tools necessary for understanding natural phenomena and transferring theories to explain them (Agbata *et al* 2024).**
- **Therefore, Mathematics is central to scientific development and innovations.**
- **Mathematics is applicable in various area: Economic. Science, Engineering, Technology, IT e.t.c.**

None of these can exist independently without involving mathematical concepts



Background ……

- Despite the importance of mathematics in the development of society, the Performance of Students in Basic Mathematics was consistently low relative to other subjects for the past decade.
- The pass rates recorded from 2015 to 2024, averages approximately 20.37 per cent with only year 2017 recording better pass rates at 32.00 per cent, meaning the remaining 68 per cent failed the subject.
- The pass rate observed for the period (2015-2024) indicate the percentages of students acquired minimum pass requirement to those with maximum requirements (A –D Grades)
- Thus, if the pass rates were further disaggregated, the performance of students in the subject would be much weaker.

Performance of students in compulsory subjects

Subject	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Civics	68.77	83.87	78.65	72.07	73.81	85.57	71.13	31.12	48.27	33.24
History	68.48	73.56	48.97	61.08	49.65	50.70	49.77	53.80	50.71	56.37
Geography	50.55	53.88	56.80	63.37	63.99	49.93	52.30	55.00	53.78	58.51
Kiswahili	86.34	90.06	91.92	87.55	92.19	92.38	95.21	95.66	95.19	81.74
English Language	80.83	77.21	81.16	87.68	80.05	80.81	86.49	60.31	68.27	74.58
Physics	25.86	28.13	36.74	48.01	50.28	22.57	31.03	18.21	18.06	23.29
Chemistry	40.27	45.76	51.98	53.22	44.79	42.85	42.37	33.43	28.16	34.29
Biology	57.92	63.09	53.16	68.84	64.40	61.52	51.98	46.96	55.74	47.00
Basic Mathematics	**15.21**	**21.55**	**32.00**	**22.95**	**21.09**	**15.94**	**19.52**	**15.56**	**21.08**	**18.85**

Background cont.

- The Problem:
- After every assessment circle, the National Examinations Council of Tanzania (NECTA) issues Students Item Response Analysis (SIRA) reports for all major subjects.
- Despite these reports, performance of students in Mathematics remained low.
- Factors for students' low performance is documented in SIRA reports, the reasons for the persistence of those factors despite being reported frequently is unknown.
- Not much factors identified by students are documented. This and the persistent low performance influenced the need for the study.

Objectives of the study

1. Investigate on the problematic content areas frequently reported in SIRA reports;
2. Identify the challenges which students face in responding to mathematical problems as reported in the SIRA reports;
3. Explore the opinion of students on the causes of weak performance in Mathematics in the FTNA, and
4. Evaluate the teachers' awareness and use of the recommendations presented in SIRA reports.

Study approach

- The study adopted a qualitative approach to analyse secondary data from 10 (FTNA) in the ten years Students' Item Response Analysis (SIRA) reports focusing on student's responses in Basic Mathematics who attempted the Form Two National Assessment period 2015 to 2024.
- This period was chosen because this is the time when NECTA started to administer the FTNA.
- The approach also was used because it was deemed suitable to;
  - analyse data from semi-structured interviews to evaluate teachers' awareness of availability and utilization of the SIRA reports.
  - analyse data from focus group discussions to explore students' perceptions on the factors leading to unsatisfactory performance in Mathematics.
  - analyse descriptive data presented in SIRA reports.

Population, Sample and Sampling procedures

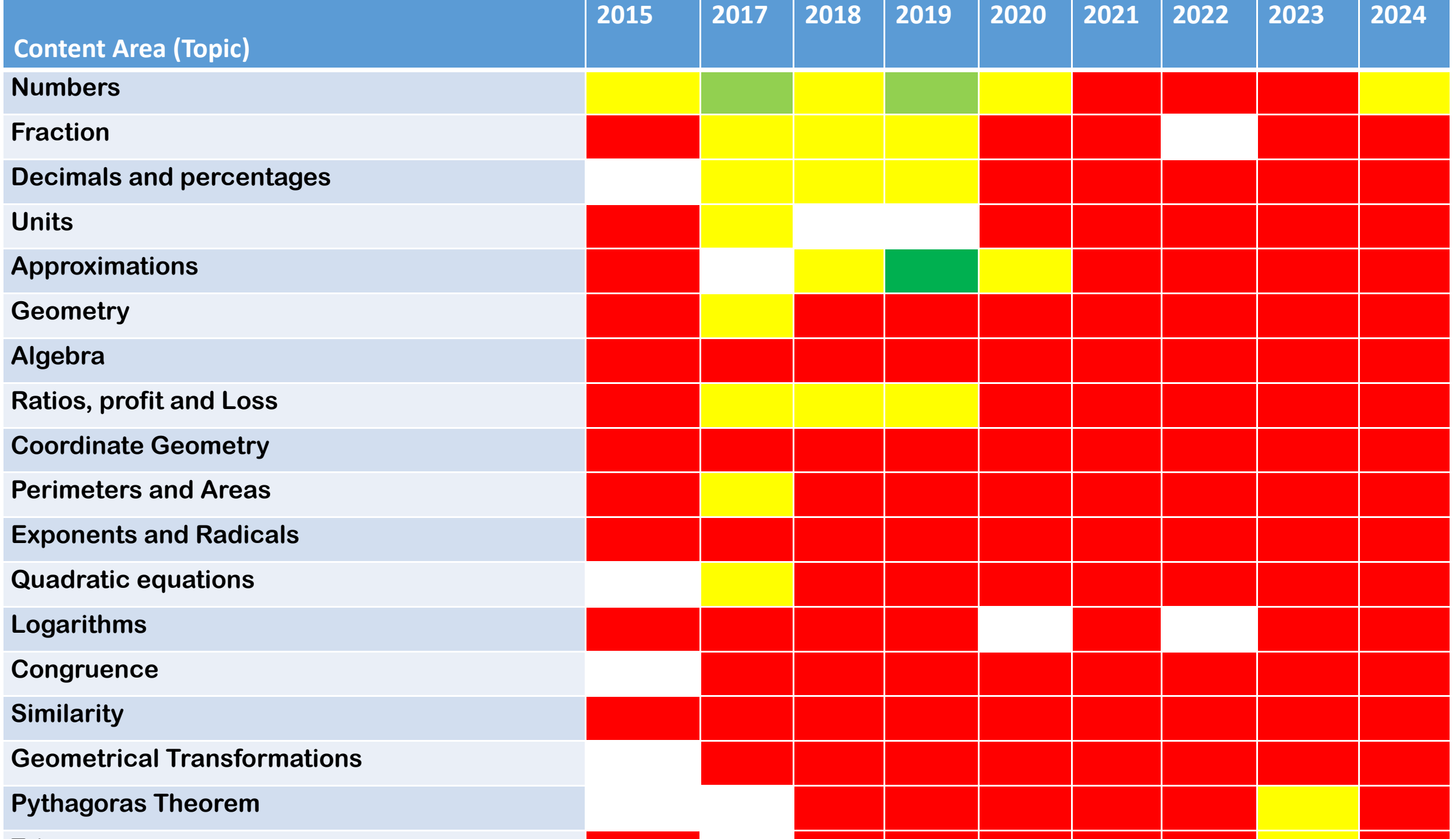
- To explore problematic content areas and the factors that leads to students' low performance the study aimed to review 10 Basic Mathematics SIRA reports.
- Researchers however, accessed 9 out of the 10 reports making 90 percent of the intended document. The 2016 report was unavailable.
- To get participants for semi-structured interview and focus grop discussion, PReMS system which manages students enrolment records was utilized to randomly select, 10 schools with form III students in Ubungo Munispal in Dar es Salaam by assigning a unique number to each school.

Data analysis

- To determine problematic content areas, the pass rate of students in each tested content areas in each year was tabulated and coded with green, yellow and red colours to represent good, average and weak performances respectively. (The colour codes were adopted from SIRA reports).
- Content analysis was used to analysed the challenges reported in all the SIRA reports which the researchers accessed. This process involved data coding and categorizing the emerging themes. Through this process, the challenges were compared and contrasted to establish broader categories for clarity through the observed period.

RESULTS

- **Problematic content areas:**
- **The study found that, most students struggled in almost all content areas indicated by dominant red colour across the content areas in the studied period.**
- **Performance was slightly better in six content areas namely *Numbers, Fractions, Approximations, Ratios, Profit and Loss* and *Units*.**
- **the performance of students in 14 content areas out of the 20 content areas taught at this level was weak throughout or average at least once in the observed period.**


Content Area (Topic)
2015
2017
2018
2019
2020
2021
2022
2023
2024
Numbers
Fraction
Decimals and percentages
Units
Approximations
Geometry
Algebra
Ratios, profit and Loss
Coordinate Geometry
Perimeters and Areas
Exponents and Radicals
Quadratic equations
Logarithms
Congruence
Similarity
Geometrical Transformations
Pythagoras Theorem

RESULTS…..

- Factors that lead to weak performance according to SIRA reports
- ***Insufficient Knowledge:*** students lack knowledge related to specific content areas. Thus, students failed to attempt the questions even when the application was directly related to a particular content area.
- ***Poor interpretation skills:*** Students failure to interpret the demands of the questions especially word problems or interpret mathematical diagrams. Consequently, the students failed to develop mathematical expressions that would lead to determining a solution.
- ***Inability to Apply Mathematical Formulae, Rule, Laws and Theorems.*** Students found it difficult to use appropriate formulae, rules, laws and theorem to problems which required them to do so

RESULTS....

- **Students' Opinions on the Reasons for Poor Performance in Mathematics**
- ***Nature of the Subject:*** In other subjects, students' responses can vary in terms of accuracy leading to variation in their scores. In Mathematics a misinterpretation of the question, improper application of a rule, law, theorem or formula leads to complete incorrect solution and consequential loss of scores.
- ***Lack of motivation from peers and Adults:*** Students were of the opinion that the assumption most hold about Mathematics being difficult creates a barrier to learn effectively even when the content is not really difficult.
- ***Ineffective teachers' pedagogical skills:*** A few students questioned the pedagogical content knowledge of their teachers, citing things like inability of some teachers to connect some mathematical content with some real-life application.

RESULTS .....

- **Access and Utilization of SIRA Reports by Teachers**
- 40 percent of the teachers acknowledged accessing SIRA reports on the NECTA website while 60 percent did not know that the reports were published on the NECTA website.
- The 40 percent of the teachers who participated in the study reported occasional use of reports citing them as useful references especially in identifying sources of students' mathematical errors.
- though difficult to generalize due to limitation of the sample, it suggests some of the reasons for poor performance is the fact that many teachers do not utilize these resources.

Conclusion

- The study highlights significant challenges that students face in learning Mathematics as articulated in the findings. It is suggested that, further studies be directed on investigating the alignment of pedagogical methods in Mathematics teaching and learning. The current SIRA reports show what students cannot do in attempting mathematical problems. However, there is limited documentation on the appropriateness of pedagogical approaches in teaching Mathematics and whether teachers update their teaching skills regularly. Addressing this gaps could improve Mathematics education and improve students' learning outcomes.

THANK YOU FOR LISTENING