

On Understanding and Improving Teaching through Reflection on the Mathematics National Examinations and National Education Goals: A Case of Malawi

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Abstract

There have been so many reports that discuss the importance of validating examinations to check if they assess what they are intended to assess. The aim of this article is not to discuss the importance of validating nor the validation process but rather reflections of the extent to which National Educational Goals (NEGs) and Secondary Education Goals (SEGs) are reflected in a National Examination paper. In order to do this, I have used content validity analysis of the Mathematics National examinations from the year 2005 to 2009 in relation to the NEGs and SEGs. This content validity, grounded on Burnstein's (1990) work, is established in a three-point framework: (1) internal analysis of the examination papers, (2) comparison of their contents with the Topic Objectives, and (3) comparison of their content with Subject Objectives and Secondary Education Goals. The results of the analysis show that there is consistency between the examinations and the Topic Objectives however, 56% of the Subject Objectives are not covered in the national examinations. This article also presents a discussion of the implications of these findings in the mathematics teaching and learning. The article ends with a number of recommendations derived from the results of the analysis.

Keywords: Validation; national examinations; national education goals; Secondary Education Goals, content validity

1. Introduction

The analysis reported in this article is grounded in the Burstein, Aschbacher, Chen, and Lin, (1990) work where the authors discuss the content validity of tests that are designed to serve multiple purposes. Tests or examinations at national level serve different purposes including selection, monitoring programs, instructional improvements as well as political reasons where the examinations become the gatekeeper to education. In whatever sense examinations are used, Burnstein et al (1990) indicates that there is need to validate them to ensure that they serve the intended purposes.

According to Chakwera, Khembo and Sireci (2004), examinations in developed countries are held at very high standards. Since most developing countries obtain their tertiary education from these developed countries, there is pressure to ensure that the examinations offered in their countries are of high standards of quality as well. It is in the understanding that the high standards of education would firstly have to be reflected in the National Education Goals (NEGs) of a nation, which then influences the Secondary Education Goals (SEGs) and then later influences the type of curricula to be developed. Within the curricula there are Subject Objectives and also Topic Objectives for each topic within a subject developed.

In most cases, these Goals and objectives are assessed through the national examinations of a nation. As a result, it is very important that the examinations set be according to the standard required as well as be in line with the goals of the nation so that the feedback needed whether the Goals are being achieved should be valid and reliable. In line with this argument, this article presents a discussion about reflections from the

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national examinations offered in Malawi in relation to the NEGs and SEGs. Through content validity exercise, this article analyses each item on the national examinations, what it assesses, whether and how the NEGs are achieved.

This content validity exercise is therefore guided by the following specific objectives:

1. Examine the Secondary Education Goals (SEG) derived from National Education Goals (NEGs).
2. Scrutinize the Subject Objectives (SO) in Senior Secondary Mathematics.
3. Examine Topic Objectives (TO) in subject objectives
4. Examine the main focus areas in the Mathematics National Examinations at Malawi Secondary Certificate Examinations (MSCE) level.
5. Discuss the consistency and the gaps that exist between the SEGs, SO, TO and Examinations.
6. Provide suggestions for improving assessment.

Literature indicates that there is a dependency on how the objectives of a Secondary School Teaching Syllabus are derived from National Education Goals. Using the SO, mathematics content to be taught is determined. The mathematics content that is determined from SO is divided into different topics of which each topic has its own objectives called Topic Objectives. Understanding the trend of dependency of objectives is crucial and important as it ensures consistency in the education system. However, as pointed out earlier there is need to conduct an assessment, to establish whether what was planned as stated in the National Goals of education have been achieved.

In this paper, therefore, I provide an overview of the consistency from the NEGs, SEGs, SO, TOs and what is examined in the national examinations with a focus on Mathematics. I begin with a description of the education system and its major national educational assessment in Malawi.

2. Education System and Major National Educational Assessments in Malawi

Education system in Malawi follows the 8-4-4/5 system, where the first 8 years are for primary schooling (equivalent to grades 1 to 8 in the United States), 4 years are for secondary education (equivalent of grades 9 to 12) and last 4/5 years are for tertiary (university) education. The first four years of schooling (standard one to standard 4) is called junior primary school, while the last four years (standard 5 to 8) is called senior primary school. Similarly, the first two years of secondary education (forms 1 and 2) are called junior secondary school and forms three and four are referred to as senior secondary school.

At the end of 8th year of primary school, the learners sit for Primary School Leaving Certificate Examinations (PSLCE) of which they get a certificate if they pass. PSLCE is used to select learners to go into secondary education whether government or private schools. At secondary school level, students sit for two major examinations, Junior Secondary Examinations (JCE) at the end of second year and Malawi Secondary Certificate Examinations (MSCE) at the end of fourth year. Below is a summary of Malawi's major educational assessments as well as the examinations given at a specific level.

Table 1: Summary of Malawi's major national educational assessments

Type of Examination	Year (Grade) administered	Purpose
PSLCE	8 (grade 8)	Selection into secondary school
JCE	Form 2 (grade 10)	Entry into form 3 (grade 11)
MSCE	Form 4 (grade 12)	- Secondary school exit - Tertiary education admissions - Basic employment certificate

It is worth noting that all Examinations mentioned above, PSLCE, JCE and MSCE are public examinations. Meaning that, they are all regulated by the government examining body called Malawi National Examinations Board (MANEB). This body is there mostly for administration and coordination of

the examination process. The setting of the examination papers, invigilation of the examinations and marking of the written examination scripts is done by secondary school teachers hired by the Board.

Maneb was established in 1987 by the act of parliament, mandated to carry out all national examination assessment activities in Malawi. Examinations in Malawi are both subject and syllabus based. As a result, the mode of examinations is largely written examinations. Even though there are other reasons for national examinations, it has been noted that the main aim of national examination assessment in Malawi is to offer policy options to improve the quality of education (Kananji, 2014) in order to meet the international standard of education.

Other National Assessments in Malawi

Malawi at primary level has been involved in a number of national assessments. For example Kananji (2014) explains that Malawi is involved with Early Grade Reading Assessment (EGRA), which assess standard 1 and 2 learners in basic literacy in the local languages, such as Chichewa, Tumbuka and Yao. The mode of assessment in this case is done orally. There is also Primary Achievement Sample Survey (PASS), which targets standard 3, 4 and 7 in 2 subjects namely, English and Mathematics. This is done through a written examination. Malawi is also engaged in Monitoring learning Achievement (MLA) targeting standard 2, 4 and 7 in subjects of Mathematics, English and Chichewa and is a written based type of assessment.

In addition to the assessments described above, Malawi participates in Southern Eastern Africa Consortium for Monitoring Education Quality (SEACMEQ) running in series of which the fourth series was conducted in 2013. This kind of assessment targets standard 6 learners in mathematics, English and Health Knowledge also known as Life Skills. This is a written examination as well.

In all these assessments, the main goal is to assess if the learners have achieved their level of competencies in their grades. The results have revealed that learning outcomes among primary school learners is very low. Most learners involved in these type of assessments fail to get a score of 50%, indicating that they fail to master the grade level competencies in their grades. However, Kananji (2014) indicates that efforts are being done to find and implement appropriate interventions to improve the situation on the ground

As noted, these assessments that target the competency abilities of the learners are done at primary level of schooling. However, the validating of the examinations themselves in order to assess whether they achieve the intended purposes has been an area that has not received attention needed. It is important therefore that content validity exercise has to be done on all examinations offered..

For the purposes of this article, the content validity being presented focuses on the Mathematics Examination papers set at MSCE level, the Topic Objectives (TO) within the senior secondary mathematics topics, the Senior Secondary Mathematics Objectives (SO) as outlined in the senior secondary mathematics syllabus and the Secondary Education Goals (SEG) in general. It checks the consistency among the areas mentioned.

The Content Validity Exercise

There is a lot that has been reported about the importance of examinations, for example see (Anderson, 1985; Leitzel, 1983). In Malawi for example, examinations are very important that they have assumed a “gate keeping” role in the system (Chakwera, et al, 2004). As a result, examinations have a great influence on what goes in schools. Chakwera, indicates that the curriculum at all levels generally incorporates all issues of cognitive, psychomotor and affective domains, but, the national examinations offered by MANEB mostly focus on cognitive domains only and therefore the teaching instruction has also become examination oriented. Even though validity of national examinations in this case can be a contentious issue on a political side, it is also important on the other hand to examine whether the national examinations assess what is intended to assess as well as looking at the extent to which the national education goals are assessed in the national examination goals.

Literature indicates that examinations can take different forms and may be used for other purposes rather than teaching and learning. For example, examinations are used as a type of selection assessment, i.e., they are used to determine who will go to the next class. Since it is perceived as gateway, it is supposed to be attached with great importance by teachers and their students to make sure they are well prepared so to pass the examinations. Taking examinations as gateway may shift the focus of teaching methods and even the way students learn by developing examination tallied. This shows that examinations are very crucial and key to the teachers as well as learners. Examinations therefore need to be administered very carefully and content validity should be a must for all examinations at all levels.

Apart from that examinations serving as a “gate keeper” in Malawi, they are also designed to serve other several purposes demanded by educational standards, such as program monitoring, accountability, and instructional improvement, and therefore, examinations have to be validated to ensure that they serve the intended purposes (Burstein, Aschbacher, Chen, and Lin, 1990). Examinations are linked to instructional improvement and accountability in different ways. For example, Burstein et.al., (1990) and Leitzel, (1983) argues that examinations can be used as achievement indicators to influence or drive the objectives of the curriculum and instruction methods. Burstein et al further argues that when examinations are used as outcome indicators for a relatively diverse set of school programs, as in Malawi, they can reflect instruction in broad terms and hence are unlikely to have a direct instruction influence at the point of delivery and the classroom, but will more likely have a direct link on the subject objectives of the curriculum.

With the possibility that examinations can have a link on the subject objectives, it is crucial therefore that quality control of the various examinations that are administered at whatever level is enhanced through content validity. Content Validity in this article means, whether the examinations adequately reflect the content stated or implied by the Standards [objectives of learning] (Burstein et.al., 1990). By ‘content’ Flanagan & Mott, (2001) mean knowledge, understanding, skills, habits of mind, and so forth, (p.27) contained in both the secondary education objectives and subject objectives. Hence, as pointed out earlier, examinations in Malawi offer policy options to improve the quality of education standards.

The importance of content validity of examinations therefore cannot be over emphasised. According to Burstein et.al. (1990), through the process of validating the examinations, the examiners themselves, who are teachers in this case, will specifically know what a Standard, in this case subject objectives, means. The subject objectives in this case become the standard of which the examination is trying to assess. Examinations “are an excellent medium for conveying the meaning of educational objectives or standards, as each question is a concrete instance, rather than an abstract generalization” (Burstein et.al., 1990; Flanagan & Mott, 2001, p.27). Flanagan and Mott further argue that tests [Examinations] will help students to understand what they must learn to be proficient on the Standards.

In addition to this purpose, Martinez et.al (2007) cites Black & Wiliam (1998) that the examinations are used as

“formative assessment (Black & Wiliam, 1998), that is, they are designed to inform and possibly change instructional practice. Black and Wiliam (1998) define formative assessment as all assessment activities undertaken by teachers and students when the evidence drawn from such activities is used to adapt teaching to meet student needs. Formative assessment, as Black and Wiliam and others (e.g., Pellegrino, Chudowsky, & Glaser, 2001) define it, is often times situated and initiated at the classroom level by the teacher. However, in this paper, I expand on this definition to include national examinations and all assessment activities with the intent of informing instructional decisions, regardless of who undertook such efforts.”(p.3)

This means even the National examinations can also fall in this type of assessment. This is because, through the results of these examinations teachers are judged as to whether they prepared students for the examinations or not. The results of MSCE for example in Malawi, usually reflects on the teacher’s delivery of the curriculum in a classroom. Schools use MSCE results as indicators to use during decision making such as identifying subject areas that need additional instructional support among other things. As such, the examinations like MSCE fit the definition of formative assessments.

In order to maximise the effectiveness of formative assessments Martinez et.al (2007) also cites Webb (1999) and Black and Wiliam (1998) and Wade (2001) on page 4 saying:

“Webb (1999) and Black and Wiliam (1998) suggest that in order to maximise the effectiveness of formative assessments they should be aligned with curriculum, instruction, and state standards. Wade (2001) also argues that assessment data is most useful in positively impacting educational outcomes when it is valued by school staff and systematically collected and analyzed. Based on Black and Wiliam’s review of research on whether formative assessment could lead to improved student learning outcomes, they not only conclude that it can, [but] they also argue that there is significant room for improvement of formative assessment practices. [The authors] also lend further credence to the use of standardised measures of assessment that are administered across classrooms for formative assessment purposes, and suggest that effective learning is impeded because teachers do not often share assessment questions and methods across classrooms.

Synthesis of the Framework

The main argument in this section is that, even though there are many ways of how National Education Goals (NEGs) can be assessed, national examinations have also its own part to play in checking whether the NGEs through the education system are achieved or not. The national examinations should be set to meet the education goals. I believe that Malawi and elsewhere have their own NEGs which influences the Secondary Education Goals (SEGs) and in turn influences Secondary Subject Objectives (SO) and then the content to be covered as well as their objectives. At one point it is important to assess whether these NEG/SEG and SO are being achieved and make appropriate decisions.

In Malawi every student who passes through secondary education is required to sit for MANEB examination after four years of secondary education. These examinations are used to assess not only whether the topic objectives have been achieved but also whether the SO and SEG have been achieved. I understand that the SEG cannot just be measured through one subject only, but all subjects together. This means that even in Mathematics as a subject, these SEG have to be reflected in one way or another. Implying that assessing whether the SO have been achieved or not will in one way or another tell us whether the SEG in relation to Mathematics are being achieved or not. The same applies to all the other subjects. What I see as crucial here are quality assurance measures that have been put in place to assess the SO and SEG. Does assessing TO imply that we have assessed the SO and SEG? Also to what extent do national examinations cover the subject objectives?

Furthermore, we have debated quite well on how to improve the education standards and achieve the national educational goals. Some of these ways include improving infrastructure, increase funding, need to have trained and qualified teachers, improving student teacher ratio, good working environment among others. The factors listed above and others may be perceived as better positioned to improve and achieve the NEGs. But the question is how are we going to establish whether education goals have been met? It appears that all this boils back to the SEG. What are they, how are we assessing and whether we are achieving these standards? Is there a process of reflection in our standards?

3. Methodology

As explained earlier, this article focuses on the Mathematics Examination papers set at MSCE level, the Topic Objectives (TO) within the Senior Secondary Mathematics Topics, the Senior Secondary Mathematics Objectives (SO) as outlined in the senior secondary mathematics syllabus and the Secondary Education Goals (SEG) in general.

Also, examinations in Malawi have two important characteristics as described by Burstein:

- External development – they are developed by an independent body as described above, however, it contracts teachers who set, invigilate and mark the examinations in conjunction with subject officers at Maneb.

- Subject matter focus – they are designed to measure what students know about the subject matter and could conceivably have learned from their school experience.

To do this review, I have used Burstein et.al. (1990, p.8) three-part model for the content validation and have borrowed his internal analysis procedures to analyse the Malawi National Examinations in Mathematics as described below.

1. Internal analysis of the MSCE Mathematics examinations.
2. A comparison of what is being assessed at MSCE in mathematics with TO within mathematics syllabus in order to check if the examination assess what is supposed to assess.
3. A comparison of the TO with the SO and SEG in order to check if there is any consistency between the two objectives.

Below I describe briefly the procedures that were employed to carry out each type of analysis.

4. Procedures

- **Internal Analysis of MSCE Mathematics Examinations**

There are two different papers that are set for MSCE Examinations called paper I and paper II. (Paper I is considered as a relatively easier examination paper as compared to paper II). Paper I has only one section containing 24 questions of which students are expected to answer all of them in 2 hours, while paper II has two sections, A and B. Section A contains 6 questions, each question with part a and b and students are required to answer all the 6 questions from this section. Section B has also 6 questions where students are asked to answer any three. Secondary school mathematics teachers in conjunction with the mathematics subject officers at the MANEB set test Items in these papers.

I analysed, the Secondary school mathematics objectives (here referred to as SO), followed by the topic objectives and then finally the 10 mathematics examination papers, five of each of mathematics papers I and II from the year 2005 to 2009.

- **Analysis of SOs**

The objectives for secondary school mathematics subject are derived from secondary education goals (SEG) which are also derived from National Goals of Education (NEG). The secondary education objectives of Mathematics are stated in terms of student behavior which are as shown in Table 1.

Table 1: The Secondary School Mathematics Objectives (Referred to as SO).

The Senior Secondary School Mathematics aims at:
1. Stimulating and encouraging innovation, creativity and problem solving
2. Developing mathematical concepts for better understanding of the environment
3. Building understanding and appreciation of mathematical concepts and computational skills in order to apply them in everyday life
4. Developing logical thinking in the students
5. Developing and fostering speed and accuracy in performing mathematical operations
6. Developing in the students positive attitudes towards mathematics
7. Providing necessary mathematical prerequisites for further education
8. Discussing mathematics using appropriate mathematical language
9. Making students realise that mathematics is part of their culture

Table 1 shows that objective two relates mathematics to the environment, objective three relates mathematics with everyday life, objective six target developing positive attitude in students while objective nine would like to see Students realise that mathematics is part of their culture. All these objectives are consistent with the SEG and NEG.

• **Analysis of Topic Objectives**

In this paper I present a sample of two topics of Quadratic expressions and equations as well as Circle from the senior secondary mathematics syllabus as shown in table 2.

Table 2: Topic Objectives, Content to Be Covered and Suggested Modes of Assessment.

Topic	Objectives	Content	Suggested modes of assessment
Quadratic expressions and equations	Students should be able to <ul style="list-style-type: none"> • Factorise quadratic expressions • Calculate roots of • Complete the square of quadratic equations ... • Formulate quadratic equations given roots • Etc. 	Factorisation of quadratic expressions Completion of square Etc	written exercises tests
Circle	<ul style="list-style-type: none"> • Identify chords etc • State chord properties • Illustrate ... 	Parts of a circle Chords properties etc.	written exercises oral exercises tests

Let me draw your attention to how the objectives have been phrased in Table 2. You will notice that students should be able to factorise, calculate, and formulate, identify, illustrate. These objectives are consistent with the content of the topic to be covered. Modes of assessment include test and written or oral exercise. The major observation is that the objectives focus on the development of cognitive abilities of the students.

• **Analysis of the Examination Papers**

As pointed out, I analysed 10 examination papers (paper I and paper II) from 2005 to 2009. In analysing these papers, I looked for what the items are asking students to do in answering that particular question. For example, is the item asking students to evaluate, or calculate or to find something? Also I checked the topics that have been covered in each paper. Table 3 is the summary of the analysis of paper I examinations from 2006 – 2009.

Table 3: Summary of what paper I ask students to do from the year 2006 to 2009

Question number	2009	2008	2007	2006
1	Factorise completely ...	Factorise completely ...	Express ... with rational denominator	Simplify ...
2	Find $f(-3)$...	Simplify ...	Find ...	Factorise completely ...
3	Calculate	Simplify ...	Factorise completely ...	Calculate the volume ...
4	Calculate ...	Make ... the subject of the formula ...	Find the range ...	Find $f()$...
5	Evaluate ...	Calculate the angle ...	Express b in terms of	Calculate the length of ...
6	Calculate ...	Find the value	Calculate angle ...	Find the polynomial ...
7	Solve ...	Calculate the values of ...	Find the equation of the line ...	Calculate the value of ...
8	Find the value of	Find the sum of ...	Calculate the value of ...	If the sum of ... is ..., how old is Mary

9	What is the probability	Calculate the value of ...	Simplify ...	Find Without using calculator ...
10	Find the gradient ...	Solve the equation	Simplify ...	Prove that
11	Find the value	Find the value of ...	Evaluate log	Find the values of ...
12	Find the value of ...	Calculate the height ...	Find the value of ...	Draw a speed time graph and use the graph to calculate
13	Find the value of	Copy and complete and then sketch the graph ...	Find the value of ...	Find the value of ...
14	Simplify ...	Solve the simultaneous ...	Calculate the first term ...	Find by calculation ...
15	Calculate the value of ...	Calculate the radius of ...	Solve the simultaneous equation ...	Copy and complete ...
16	Express as a single fraction ...	Calculate the deceleration	Find the translation ...	Construct ...
17	Calculate the coordinate of ...	Copy and complete the figure ...	Calculate the maximum value ...	Find the ratio of ...
18	Make The subject of the formula ...	Find	Calculate the surface area ...	Copy the figure and shade the area
19	Draw frequency polygon ...	Calculate the probability ...	Find the total distance travelled ...	Prove that ...
20	Calculate the height ...	Sketch the graph of ...	Write the 3 inequalities ...	Show that $n = mh^2$
21	Sketch the graph and shade the unwanted region	Find the value of p ...	Calculate the distance ...	Using a tree diagram calculate the ...
22	Calculate the speed ...	Construct in the same diagram ...	Calculate the mean	Find the sum of the first ...
23	Find B given that ...	Find In terms of ...	Calculate the area ...	Simplify ...
24	Find the quadratic equation	Draw a pie chart ...	Draw a tree diagram...	Find ... in terms of ... and ...

Analysis of the topics covered, shows almost all the 23 topics in the senior secondary mathematics syllabus are covered in each paper. Also, all the papers focus on the cognitive abilities of the students.

A comparison of what is being assessed at MSCE in mathematics with TO within mathematics syllabus

Comparing Table 3 and Table 2, we discover that the operations that students are required to demonstrate in the examinations are almost the same as the TO. My interpretation of the results from Table 3 and Table 2 is that the operations that students are required to do focus on the cognitive abilities of the students developed. There is nothing of behaviour or otherwise in nature. That means the entire MANEB examinations and the Topic objectives and its content focuses on the cognitive development of the students.

Another observation is that when I was going through each and every question in the papers, I discovered that there are no questions that focus or relate to everyday life, or culture nor environment except for two questions of paper II of the year 2005.

- **A Comparison of the TO with the SO and SEG**

Comparing the SO with the TO and the content covered in the syllabus, it is seen that objectives 2, 3, 6 and 9 from table 1 are not reflected in the topics covered and even the TO within the senior secondary mathematics topics. In as much as mathematics text books might reflect this in one way or another, but it is not part of the TO.

- **Observations/Findings from the Above Analysis**

On studying Tables 1, 2 and 3, I made the following observations:

1. Table 3 and Table 2 shows that there is a consistency between what the MANEB mathematics examinations assess and the Topic objectives.

2. Table 1 shows that there is a consistency between the SO, SEG and NEG in general.

3. A comparison of table 2 and table 1 indicates that there are inconsistencies or mismatches between the TO, what the MANEB mathematics paper assess and the SO and SEG. Not all areas covered in SO are covered by TO. In fact it is 4 out of 9 objectives that are covered by the TO, representing 44% coverage.

4. From the NEG, the objectives are stated in terms of the behaviour of learners; similarly SEG and SO are also expressed in terms of behaviour objectives. However, when we check the TO within the mathematics syllabus, they are expressed in terms of cognitive abilities. Hence a mismatch in areas of focus.

5. Since 56% of the SO are not captured in the TO, it is no wonder that the MANEB examination that targets the TO only does not cover any question on these objectives captured. Since they are not captured, there is also no mention of how the 56% of the objectives can be assessed.

5. Discussion of the Results

It is clear from what has been presented above that the TO are not related to the environment, behaviour of students, culture as well as attitude issues. In as much as the mathematics text books might have some elements that touches these areas, but the fact that they are not reflected in the objectives, it might be the same as saying they do not exist in the senior secondary mathematics syllabus because it is not the target area. This suggests that these areas are not the core of the subject. But even though these areas are not the core of the subject, the SEG show that they are among the core areas to be focused on. The critical question remains; are these areas being addressed in secondary schools? And if they are not examined, what type of students does our education system produce in terms of mathematics.

It is well known that teachers are in most cases examinations oriented. The teaching methods are tallied towards examinations. Based on the analysis presented in this article, which clearly shows that the national examinations target more of the TO that focus only on cognitive abilities, no wonder that teachers just focus on developing the cognitive abilities of the students because that's what will come during examinations. The justification here is why teachers should focus on something that will not be examined. Teachers would rather focus on what will benefit the students, i.e. passing of the examinations as this will be the yardstick that they will be measured with. Therefore, if the TO and examinations do not include the behaviour aspect of the learner, the environment, everyday life, culture and others, the teaching of mathematics would not change.

Report suggests that, secondary students sometimes complain that mathematics they learn is abstract. There have been reports from different quarters, which show that female students do not like mathematics because it is not related to their everyday life. In other words, they don't see the meaning of learning mathematics. As said earlier the books may contain parts that focus on different areas, however, what matters is the TO of mathematics. Even if we say students should practice the solving of mathematics on their own,

one wonders what they are practicing, my guess is they are practicing in order to achieve the same goals as expressed in the TO. My suggestion here is that in order to improve mathematics, there should be a deliberate effort in updating what appears in the TO. Let the TO have the same areas as reflected in SEG and SO such as; behaviour of the students, culture, environment and everyday life of students. Likewise let the mathematics examinations have these areas covered. Let the items in the national examinations come closer to the real life of the students as much as possible.

In this article I am not saying that the objectives targeting cognitive levels are wrong however, there should be a balance and consistency among these objectives. How do we establish whether the behaviour objectives in SO have been achieved if the objectives at subject level only assess Cognitive objectives?

6. Recommendations

From the results of this content analysis I put forward the following recommendations.

Both the TO and national examination should cover all the areas of focus in the SO. It is my conviction that if all objectives are well covered in the examinations, students and teachers would see the need of learning mathematics and hence improving on the pass rate of students in mathematics examinations.

Content validity in mathematics examination papers should be done on every paper that they are setting. This content analysis can be done by firstly keeping the standards both the subject objectives, and topic objectives directly in the view of the examiners as they write, review, and revise examination items. Each item within an examination paper needs to be directed towards measuring a specific, subject and Topic objectives. This can be done by mathematics teachers, administrators, and mathematics curriculum specialists who could also review all of the examination items of content validity. Objectives that have not been met and items which appears mismatching with the stated standards should be restructured, so that it reflects the subject objectives.

The administrators and examiners concerned have to be prepared to receive comments from the users, for example teachers themselves or the students who are writing that examination concerning the appropriateness of the examination content. All such comments need to be considered seriously for possible review or changes be made to the examination paper, where appropriate. This means that examination evaluation slips should be distributed to all schools, in order to get feedback on whether the examinations covered all what need to be addressed.

Furthermore, the mathematics teachers need to be aware of the subject objectives. Even though it is not part of this article, but it appears that most mathematics teachers, even the mathematics teacher educators do not know the SO. Which means that even at college level, mathematics teacher educators should know these subject objectives. I also recommend another content validity exercise on the mathematics text books being used.

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