Appendices

Appendix A - Class lessons from where excerpts were taken.

Grade one class lesson
1. T: Bakadoli pa kwenda! [teacher starts class by singing a song]
2. Ls: Balelingana! [Learners respond -singing back in Chorus, in loud pitched voices.]
   [At this stage learners are moving to the front in single file, according to their groups. There is a teaching corner in front where the teacher introduces the subject matter for the day. The pupils were organized into four groups Manga, Papaya, Nthochi and Matimati. The groups were organized according to ability levels in literacy and to an extent numeracy). The teaching corner had mats where learners sat on. The mats were in front and immediately next to the mats was a chair for the teacher. The teacher sat on this chair very close to the board and other teaching aids. The learners were able to look at the teacher and the board. Both boys and girls sat on these mats.]
3. T: Wali yese wakhale pa mphasa. Iwe Memory khała pasi (Everyone, sit on the mat. You, Memory, sit down) Ok Ok Aha, mailo muzibalo tikalemba vichi? (yesterday in Mathematics what did we write?)
4. T: Mailo tikalemba thene, thene mbwene thene.(Yesterday we wrote like this and then like this) (Teacher was writing on the board as he spoke.
5. He wrote 20 – 11 = 
6. Sono a pa nalemba vichi? (Now here what have I written) Jessi!
7. Jessi: Quiet, doesn’t say anything.
8. T: Joyce, Morgan yimiliran (Joyce, Morgan stand up!) [Teacher orders the two to stand as there was some commotion where they were. They were pinching each other. The learners are sitting too close to each other.]
9. Ls: “Twenty minus eleven is equal to box!” [learners chorus the statement on the board]
10. T: Sono apa chung’anamura kuti vichi? Pa 20 tifyumwepo vichi? (Now here what does this statement mean? From 20 what should we take away? [Learners
fail to say what the statement means. There is silence, and fidgeting and giggling amongst the learners]
11. L: A ticha Qabaniso wana mbembe! (Teacher, Qabaniso is fighting!)
12. T: Iwe Qabaniso leka mbembe. (You, Qabaniso stop fighting!)
13. L: A ticha Qabaniso wachali kuchita mbembe (Teacher, Qabaniso is still fighting!)
14. T: Iwe Qabaniso para wukupulika yayi, khwiza pene papo. Niza kumudyakani. (You, Qabaniso don’t you understand, I will come where you are. I will come and beat you!) [The words however do not mean that exactly, literally translated they actually mean “I will come and step on you”. Further there is some emotive respect accorded to the learner as the language refers to an adult in a sense ‘kumudyakani’]
15. [At this stage some order is restored, but it was clear that learners were not able to do the work on the board. The teacher changes the work. He draws a set with two members in it on the board]
16. T: [Teacher draws two circular objects on the board] Nijani wize kuno wizakayobo ye, utu nthulinga? (Who would like to come forward and tell us how many pieces are in this big circle?).
17. [Learner (volunteer) goes to the board and writes 2]
18. T: Sono iyi ndiyo tikuti ‘set’ (This is what we call a ‘set’) [The teacher proceeds to draw/write ‘another set’ on the board]
Pendani, ivi, vili vilinga ivi? (count these, how many are these?)
19. L: [One learner silently goes to the board and writes ‘4’. There is a din of noise amongst the learners.]
20. T: Nijani uyo woyoya yobo ya? Chongo! (Who is making noise, Stop making noise!) [Teacher writes another set on the board.] Apa pali ma set ghalinga? (Here how many sets are here?) [learners fidget, some saying “Ine a ticha” (Me teacher!)]
21. T: Iwe (you) Richard!
22. Richard: ‘Three’
23. T: Sono nanga mukati ntulinga? (What about inside, how many are they?) Iwe Jessy, zanga kuno ulembe six ‘boyi’. (You Jessy, come and write six here my friend.)

24. [There is some commotion again amongst the learners. A learner interrupts and says “A Ticha Junior wakutuka, Others join in telling the teacher ‘enya a ticha Junior wakutuka!’ (Teacher, Junior is insulting and the others also report the same that Junior is insulting!)

25. T: Junior, zanga kuno – lemba six (Junior, come and write the number six)

26. Junior: [He goes to the board, tries to write the figure six, but fails. He wrote 9]

27. T: Walemba makora? (Has he written properly?)

28. Ls: Yayi! Yayi!, Ine a ticha! (No! No! Try me teacher!)

29. T: Ok! Munyake! Mabvuto, yiza kuno nawe wuyezyeko. (Ok another one! Mabvuto come and try.)

30. Mabvuto: (He also tries but fails. He wrote a very tiny ‘two’)

31. T: Walemba makora? (Has he written properly?)

32. Ls: Yayi, awe (No, No)

33. T: Munyake (Another one)

34. [A girl learner goes to the board and writes ‘6’ correctly]

35. T: Walemba makora? (Has she written properly?)

36. Ls: Yee! Yee! (Yes!)

37. [Teacher turned to the boy who was insulting his friend, he warns him not to insult in class and at school. He then turns to the whole group. Tiyeni timu phalile kuti kutuka khuheni. Kuno ku sukulu tikuzomeleza kutuka chaa!(Let us tell him that insulting is bad. Here at school we do not allow it) At this stage the rest of the learners make a face, at the same time saying ‘Kutuka khuheni’ (Insulting is bad!). The facial expression depicted that it was something bad/distasteful]

38. [The teacher then wrote other sets on the board for learners to do as an exercise.]

40. [Learners troupe back to their seats in their groups. There is a din of noise, and fidgeting. Some keep on looking at the Researcher who was seated at the back of the class. Some pupils play amongst themselves. Learners settle down at their tables/desks. Others do not have pencils, others have left their books. There is movement of learners going from one desk to another looking for a pencil or a sharper.]

41. T: Tola buku iwe (Get your book, you!) Sara, ulije pencil? Niku patikenge ine! Mbweleka pensulo kwa banyako! (Sara, you don’t have a pencil? I will chase you. You borrow a pencil from your friends)

42. [Learners are giggling, talking to their friends – as they settle to do the work – the noise dies down a bit]

43. T: (Moving around) Iwe wulembengeni makora –date wunda lembe yayi. Isaac wutondekenge para uku yowoya yoboya. Nanga iwe nivichi? (You should write properly. You haven’t written the date. Isaac, stop talking and concentrate on your work! And you why are you not doing something? What is it?)

44. L: Mutu wukubaba. (I am sick, I have a headache)

45. T: Ok, welenga, wukaba phalile bapapi bako kuti waluwala mutu!. (Ok go home, but tell your parents that you are not well, that you have a headache)

46. [At this stage the sick learner goes out of class. Also at the same time learners that finish the work take their exercise books for marking to the teacher. Teacher gives remarks as he marks. The teacher goes outside the classroom]

47. Ls: A ticha! A Ticha! Bayanku a ticha? (Teacher, teacher, where is the teacher?)

48. [Many learners wondered aloud where the teacher had gone. The teacher walked out of class to attend to a visitor at the door. He later returned and continued marking books. He was surrounded by learners and the noise din was getting louder and louder]

49. L: A ticha!, wogazyana, a ticha wochayana! (Teacher, these have a dispute here, teacher they are fighting!)

50. T: Ok, Ok! Tose tiyeni pama desk yithu! Iwe khala pasi! Tose tiyeni tipende, One, two .. Yayi, pamoza! (Ok, ok everyone go to your desks. Hey you, sit down. Everyone, lets count together! One, Two, No together!)

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51. Ls: Wanu! Thu!, thiri, foo, faivi, sikisi, seveni, eeti, naini, teni, ...(1, 2, 3, ...)
52. T: Ok! Tamala sono, tiyeni pawalo! (OK, we have finished now, you can go outside!)
53. [The learners cry out aloud, eyee! Yaaa! As they pick their books rushing outside]
54. T: Kuchimbila yayi, fumani makora, umoza umoza! Iwe Morgan! (Do not run, go out one by one, you Morgan listen!) [At this stage the teacher links up with the researcher. I sympathize with him on the daunting task he has on managing the young learners and their learning. We both go out discussing informally the challenges of handling first graders!]

Lesson on HCF (Grade six)

1. T: We have been looking at HCF. What we said was to find HCF – we use what?
2. Ls: prime numbers! [Learners chorusing]
3. T: Let’s now use prime numbers to find the factors of these numbers [Teacher writes 18 and 24 on the board] Now what do we do, we use –prime numbers. Ok, let’s do it!
4. Ls: 1
5. T: yayi- tiyuzing’a waka ma prime numbers waka mwapulika! (No, we just use prime numbers, you understand!) [Teacher writes 18 on the board] So for this we have 18 = 2 x 3 x 3, nanga 24? (What about 24?)
6. Ls: A ticha, a ticha ine! (Teacher!, me teacher me!)
7. T: ok!
8. Ls: 4
9. T: Iwe, 4 ni prime number? (You, is 4 a prime number?)
10. Ls: [other pupils] yayi! Yayi! (No!, No!)
11. T: [Teacher wrote 2 x 2 x 2 x 3 on the board]
12. Ls: 2 Yes!
13. T: 2 x 2 x 2 x 3 is it 24? [Teacher writes on the board as he asks the learners]
14. Ls: Yes, a ticha apo tatola! (Yes, teacher, there we have got it!)
15. T: so now how do we find HCF? Tikati vichi? (What did we say?) Numbers that are common to apa na apa (here and here), [teacher writes 2 x 3 = 6 as he asks learners to contribute.] Nanga aba ma namba tikati wuli? (What about these
numbers, what did we say?) [Teacher writes 8 and 12] What are the prime factors of 8?

16. Ls: 2 x 2 x 2 [learners say as teacher asks]

17. T: Nanga 12? (What about 12?)

18. Ls: 2 x 2 x 3

19. T: Sono what is the HCF wa izi? (Now, what is the HCF of these?)

20. Ls: 2 x 2 = 4

21. T: Sono bekani apa! (Now look here!) [Teacher writes 1 x 3 = 3, 2 x 3 = 6 3 x 3 = 9, 4 x 3 = 12, 5 x 3 =15, 6 x 3 = 18] Sono apa mwaona (So here you have seen) these are called multiples of 3! [Following a pep talk after the previous class, the teacher tries to correct the mistake of the previous day without arousing suspicion of the learners]

22. T: Sono (now) what are the first six multiples of 4? What do we begin with? We began with one! So [Teacher begins to write 1 x 4 = 4, as pupils respond giving the multiples following the pattern of 3 previous example.]

23. Ls: 2 x 4 = 8, 3 x 4 = 12, 4 x 4 =16, 5 x 4 = 20, 6 x 4 = 24 [Teacher writes as learners give the answers. Teacher asks, 3 times 4 = ?, then next ni vichi (what is it?)? Ok 4 times 4 = ? etc]

24. T: These are the first six multiples of 4 which are 4, 8, 12, 16, 20, 24. sono para tachita divide by 4 agha ma number tikusanga vichi?(Now if we divide by 4 these numbers, what do we get?); 4 into 4? Ls: 1 T: 4 into 8? Ls: 2 T: 4 into 12?
Ls: ...... till 24.

25. T: Sono tiyeni tisange (now let's find) multiples of 5, What are the first multiples of five?

26. Ls: [Teacher directs as learners produce, 1 x 5 = 5, 2 x 5 = 10, 3 x 5 = 15, 4 x 5 = 20, 5 x 5 = 25, 6 x 5 = 30]

27. T: You are suppose to know the tables by heart! Mose mukwenela kumanya! (All of you are suppose the tables by heart!) Sono tiyeni tisanga ma (Now let's us find) multiples of 6 – the first six multiples of 6 [with learners generates the following; 1 x 6 = 6, 2 x 6 = 12, 3 x 6 = 18, 4 x 6 = 24, 5 x 6 =30, 6 x 6 = 36 its becoming clear that many learners do not know the tables or at least they can't just
remember what say 5 x 6 is! A few were able, but a majority were checking at the back of their exercise books for the tables.]

28. T: Sono tiyeni tose (Now let us all) – go back to your seats – I want you to find the HCF of these numbers [He writes
   i) 10, 16 HCF
   ii) 16, 10, 24 HCF
   iii) 6, 18, 12 HCF?]

29. T: Only these, you have 10 mins. The first one you find HCF for 10 and 16, the second one you find HCF for 16, 10, and 24 and the last one you find HCF of 6, 18 and 12. Use prime numbers to find these. Para wachelwa nganechongeni? (If you delay, I won’t mark your work). I give you 3 minutes, one minute per question – do not forget to write the date! [Learners begin writing in their exercise books]

30. T: Use prime numbers, remember what a prime number is! 4 is not a prime number, 6 is not a prime number! [Learners talk amongst themselves in their groups as they work]

31. T: Who has finished the first one? Aa! Aa! Too slow! [No response from the learners, busy working on the work, teacher starts moving around the class]

32. T: Tanguti vichi? (What did we say?) is 4 a prime number?

33. Ls: aawe! (No!)

34. T: Wubise, not kuti mukopelenge yayi! (Hide your answers so that others do not copy from you!) Instead of 4, use ‘2 x 2’ – mwati tuku pulikana? (Are you getting me?) Mufumbenge para munda pulike! (You should ask if you haven’t understood!)

35. Ls: A ticha! (Teacher!) [Those that finish call out for the teacher to mark their work. Some learners move around, probably checking others work, teacher notices and he cautions accordingly]

36. T: Kuba yayi ma answers ya bene! Uku kulemba ndiko kwa kumba! (This kind of writing is evidence of cheating – copying from others!) [Learners laugh!] Munyinu wamalizya zose zitatu – nipela imwe mbwenu chaa! (Your friend has finished all the three problems – you nothing so far!)
37. [Teacher writes on the board]
   1. $8 = 2 \times 2 \times 2$
   2. $12 = 2 \times 2 \times 3$
   3. HCF = 2

38. T: Ok! Ok! Tamala tose!(Have we all finished?)

39. Ls: yayi a ticha! Yayi aticha! A ticha, a ticha! (No teacher, No teacher, teacher!)
   [There is general protest – learners would like their exercise books to be marked]

40. T: mwachelwela ngachi? (Why did you delay in writing?) Nipela mukulemba nga pha chilonda, pachoko pachoko! Sono yayi nyengo yamala! Sono tiyeni tipilemo, mabuku yikani apa, nizam’chonga munokale (You write as if you are writing on a sore, very slow! Now its time up! Let’s go through the exercise, put your books here for marking, I will mark them later).

41. T: Ok! Class! You have to teach me what to do now! I don’t know much about ‘factors’ or how to find HCF, sono tiyeni mukuchita wuli? (Now, show me how do you do it?)

42. Ls: Ine a ticha (Me teacher!)

43. T: Ok, iwe! (Ok, you!)

44. Ls: $2 \times 2$, [Another shouted $2 \times 3$, yet another said ‘tisange ma (We should find) prime numbers! [At this point, there was a lot of noise]

45. T: Order! Order! One at a time, .. Ok, iwe, aawe, uyo! (Ok, you, no that one!)

46. Ls: ‘2 x 5’ [Referring to factors of 10]

47. [On the board there was the exercise (10, 16), (16, 10, 24) and (6, 18, 12) requesting for HCF.]

48. T: But how do we know these are prime numbers?

49. Ls: ‘1 x 2 x 5’

50. Ls: ‘1 x 10’, a ticha ni (Teacher it is) ‘2 x 5’, ine bachonga kale! (The answer is ‘2 x 5’, the teacher has already marked my work)

51. T: But what is a prime number?

52. Ls: ‘2’, other ‘5’

53. T: is one a prime number?
54. Ls: Yes, 1 is a prime number.
55. T: Ok! Lets list the prime numbers!
56. [The teacher wrote the following with learners suggesting on the board; 1, 2, 3, 5, 7, 9, 11, 13, 15, 17, 19, … … …]
57. T: What about the set of odd numbers? [Learners appear puzzled, it looks like they had not heard about that!] Ok! Lets list the Odd numbers and the Even numbers!
58. T: [Teacher with learners we wrote the following;  
  i. Odd: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, … … …  
  ii. Even:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, … … …]
59. T: What’s the difference between prime numbers and Odd numbers?
60. Ls: silence,
61. Ls: Vulingana waka (They are just the same!) One other learner: ‘2’ apo palije! (There is no ‘2’ there)

**Lesson on addition and subtraction of fractions (Grade six)**

[Learners who came late were punished and they came in later. Thus the class started with very few learners]

1. T: Yesterday we were looking at fractions – fractions in their lowest terms. What name is given to these [Teacher wrote 10/25 – a few put up their hands. Teacher is pointing at ‘numerator’ and ‘denominator’). Yes you!
2. Ls: numerator!
3. T: nanga iyi? (What about this?) [Pointing at the figure 25]
4. Ls: denominator
5. T: Tikuchita wuli kuti tisange ma lowest terms (How do we find the lowest terms)
6. 10/25 = 2x5/5x5 What are these?
7. Ls: prime numbers,
8. T: Is 5 x 5 correct?
9. Ls: yes!
10. T: What do we divide with?
11. Ls: ‘5’!
12. T: why ‘5’?
13. Ls: because it is common!
14. 10/25 divide by 5 = 2/5
15. T: Tinga lembaso monga iyi! (Can we write it like this one?) We have brought it to its lowest term.
16. T: Now lets look at this one! [Teacher writes 1/3 + 1/8] How do we do this? Tinga sanga wuli? (How do we find?) Tisangeso ma (We find again) highest common factors of these [Teacher confuses factors with multiples, he writes the following on the board]
   = 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, .......
   = 1, 8, 16, 24, 32, 40, 48, .......
17. T: What is the highest common ‘factor’ here?
18. Ls: ‘24’
19. T: Yes, let’s use 24, 24 is our highest common factor
20. [Teacher writes algorithm of addition of 1/3 + 1/8]
21. T: Apa pabenge number yinyake nthana tachita multiply – sono pakuti pali one mbwenu (If there was another number here we would have multiplied, now there is one then) or we can use a different method. [Teacher explains the algorithm] Here we multiply the denominators
22. T: Is this ok?
23. Ls: [Learners smile and whisper to each other that it is simple. There is some excitement.]
24. T: OK, I will give you one problem – one minute! [Teacher writes ¼ + 5/6 on the board] Ok! Chitani fast! Fast! A ticha tamala! (Teacher we have finished!)
25. [Teacher moves around marking learners’ work and assisting those with problems he moves to the board and puts up another problem]
26. T: Yila yinyake nalemba pa bodi, kuyiyamba chaa! (I have written another problem on the board, but do not attempt it yet!)
27. Ls: Ise tayambako kale! (We have already started it!)
28. T: Ok, Let’s look at the board! [The teacher had written ½ - 1/3]
29. Ls: a ticha, chongani ine! (Teacher, mark my work!)
30. T: Ok, what we do is this – we have said we first find highest common denominator! Sono apa tisanga vichi? (Now here what do we find?)

31. Ls: 24!

32. T: [writes addition algorithm for \( \frac{1}{4} + \frac{5}{6} \)]

33. T: Sono mwaona! Sono para tasanga thene, ndikokuti (Now have you seen! Now when we have found this then) we have an improper fraction. We have to divide to find a whole number. When we divide, we have.

34. [Teacher writes \( \frac{1}{2} + \frac{1}{24} = 1 \frac{1}{12} \)]

35. T: Let’s look at this one [pointing at \( \frac{1}{2} - \frac{1}{3} \)]

36. [Teacher writes the subtraction algorithm for \( \frac{1}{2} - \frac{1}{3} \) on the board]

37. T: Para ni minus, nchimoza moza waka. (When you have a plus sign it is the same procedure) [Learners are participating by answering the questions that the teacher is asking]

38. T: What is 2 into 6?

39. Ls: 3

40. T: What is 3 into 6?

41. Ls: 2

42. T: Sono nipela apa tikuchita mbuni? (Now here what do we do?) 3 minus 2 which is what?

43. Ls: 1

44. T: Nipela tasanga (Then we have found) 1/6

45. T: Sono chitani zibalo izi waka. (Now do the following problems). [Teacher writes

\[
(a) \quad \frac{3}{4} - \frac{1}{6} \\
(b) \quad \frac{4}{12} + \frac{2}{6}
\]

on the board]

46. Ls: A ticha, ndikokuti pala tasanga kuti number ikulu yili pachanya mbwenu tiyi leke thene? (Teacher, when you get a number that is bigger on top, then do you just leave it?) [Girl asking the teacher]

47. T: Beka makora ni minus iyi! (Look properly, is this minus sign?) [Teacher moves around! Some learners are calling]
Lesson on Fractions

1. T: Yesterday we started looking at fractions. What is a fraction?
2. Ls: [Mumble something in Tumbuka]
3. T: Chitumbuka chaa! (Do not use Tumbuka!) Use English!
4. Ls: Part of a whole! 2 parts of a whole
5. T: If we are told to shade this part? How many parts do we have? So I gave you some diagrams, so that you give names to some fractions – how many parts are here? [Teacher drew this diagram on the board]

6. T: Draw a diagram which has four parts and you shade four parts!
7. Ls: (A learner moves to the board and draws a diagram and shades. The diagram had 4 parts and she shaded 2 parts and wrote 2/4
8. T: Correct? Other Ls: Yes!
9. T: When you are told to draw a diagram and to shade the required parts, this is what you do! If you have something like this [Teacher writes 3/10 on the board] How many parts would this diagram have?
10. Ls: 10 parts! [They all shout!]
11. T: Ok!, now lets look at this [Teacher writes 19/3 on the board] Have we seen this fraction before? This is improper fraction. Ichi chilingana waka na imwe ba nyamata para wavwala thalawuzi lako ku mutu! Ndiko kuti chinga oneka makora? (This is like you boys, when you wear a trousers, do you wear it on your head? Would it look nice?)
12. Ls: Yayi! (No!) [Learners laugh and giggle]
13. T: Now even here this is not proper! So tikuchita thene – we divide so that we change from improper to mixed number.
14. 19/3 = 6 1/3 (mixed number)
15. Now if we wanted we can change this back into improper fraction. Then this is what we do!

16. T: What do we do?

17. [With learners working out 6 x 3 and adding 1. This is what we do, now lets do the following exercise.

18. [Teacher wrote on the board “Fractions” then immediately under ‘diagrams to show the following fractions]

19. a) 4/5 b) 8/9 c) 4/10 d) 7/9

20. [Learners start moving around looking for pencils, pencil sharpeners, rulers!

Teacher distributed rulers, some learners were looking for their exercise books which the teacher still had – the teacher started distributing the exercise books – the noise created by this died down slowly]

21. T: Remember, I want clear diagrams not rough ones. Sinifuna vima diagram va chabe chabe, vyambula kulongosoka, nishi nichongenge chaa! (I want neat diagrams, not rough ones, otherwise I wont mark your work)

[Many learners in the class could not read English confidently. The teacher had to constantly use both English and Tumbuka]

22. T: Now let’s change the following from improper fraction to mixed numbers!

Those that have finished – imwe bamene mwa siliza! Change these to mixed numbers [Teacher wrote another exercise on the board. He wrote;

(a) 18/10 (b) 43/9 (c) 53/10]

23. T: [Writes 7/2 on the board] What do we do to change this into a mixed number?

We divide 2 into 7 ni vichi? (What is it?)

24. Ls: 3 remainder 1

25. T: Ok, nipela tikulemba thene (Ok, then this is how we write) [Teacher writes 3 ½ on the board]

26. Ls: Nipela yamara! (Its finished!)

27. T: Eeeh, yamara thene, thene! (Yes, its over, just like this!)

28. Ls: Aaah!, aah!, [Surprised at ‘how simple’ or straight forward it appeared]

29. T: Sono chitani izo (Now do these) [Pointing at the exercise on the board] Ok, look at the board. Patricia collect the books.
Lesson on ratios (conversion of units of measures) (Grade six)

The lesson involved first converting centimeters to meters then millimeters to centimeters as a prerequisite to finding ratios into their lowest terms. The lesson was a continuation of the topic ratio.

1. R: OK! How many centimeters make 1 meter? [Learners were each given the 30 cm ruler to use, the researcher had a board ruler or the 1 m ruler]
2. Ls: silence, many learners were unease about the possibility of being selected!
3. Ls: 100! Ls: 10?
4. R: Utu tuma 30 cm rulers tulimo tulinga umu? (How many 30 cm rulers make one meter rule roughly) [pointing at the 1m ruler]
5. Ls = 5, 3, 4
6. R: Ok, Iwe yiza kuno, muchite measure! [One volunteer, many unwilling even after plodding] Ok, iwe (You) [Learner goes to the board in front, starts measuring]
7. Ls: [Other learners shout] Tulimo tutatu na half! (There are three and half!)
8. R: Ok, So 1 m has how many centimeters?
9. Ls: 90 cm, Ls: 95 cm, Ls: 100 [Learners shout different figures, no one appears sure, but they try to look for confirmation from the researcher.]
10. R: It is 100! 100 cm make 1 meter [The information is written on the board]
11. R: How many millimeters make 1 cm? Checkinani pa ma ruler yinu! (Check on your rulers!) [Learners check but do not seem to know how to read/get the answers]
12. Ls: 300 Ls: 30
13. R: Checkinani pamaruler yinu! (Check on your ruler!)
14. [The model ruler was drawn on the board]
15. R: Mwaona 30 cm vikulingana na 300mm. Sono nanga 1 cm? (Now you have seen 30cm is equivalent to 300mm, so what about 1 cm?). [Some learners shout 10 mm, others reject but waiting for answer to be given. Others were not able to follow.]
16. R: Now Look here, one corresponds with 10, 2 na (with) 20, 3 na 30, 30 na 300!
   [Researcher wrote the simple conversions on the board i.e
   \[1m = 100 \text{ cm}, \quad 1\text{cm} = 10 \text{ mm} \quad 30\text{cm} = 300 \text{ mm}\]
17. R: Which is longer between a centimeter and a meter?
18. Ls: a cm
19. R: Chikulu ni vichi pa cm na meter? (Which is longer between a cm and a meter?)
20. Ls: cm, m
21. R: Nijani wize kubodi to draw 1 cm and 1 m (Who can come to the board and draw 1 cm and 1 m)
22. [No volunteers, till one is forced to go to the board]
23. R: What about mm and cm?
24. Ls: mm is bigger? [Again a learner is asked to go to the board to draw 30 mm and 30 cm.]
25. R: Now which is longer? A mm or a cm?
26. Ls: a cm!
27. R: Ok, now let's get back to our ratios. [Researcher wrote problems on the board on ratios as follows; “1m : 60 cm” “300 mm: 40 cm”
28. [With the class the researcher worked out the lowest ratios]
29. [After this, learners were asked to copy the conversions on the board and the examples given.]
An exercise was given as follows:
1) 1 m : 25 cm  
2) 30 cm : 60 mm  
3) 75 cm : 2 m  
4) 45 cm : 2 m

The solutions varied as follows (mostly the ones with errors)

Classroom discourse as learners worked on tasks set in context (Grade six)
[The learners in their groups, went through the problems aloud making sure that everyone understood the task.]

1. R: Tapulika tose? (Have we all understood?)
2. Ls: eeh! Eeh! (Yes!)
3. R: Ok! Yambaniko, muchite discuss muma group yinu!(Ok! Start, discuss in your groups) [Learners observed working individually, only talking to their friends to ask for something]
4. Ls: A ticha! A ticha! (Teacher, teacher!) [The researcher moved to where two girls were calling for his attention.] A ticha sono apa tisangenge wuli? (Teacher, here how do we find the answer?)
5. R: Mwapulikisa question? (Have you understood the question?) Likuti wuli? (What does it say?)
6. Ls: A ticha ati, para watapa maji 9 litres mbwenu uyu naga? (Teacher, when this one draws 9 litres, then what about this one?)
7. R: Sono uyu peru njazilinga? (Now this bucket is for how many litres?)
8. Ls: 5 litres!
9. R: So musangenge wuli? (So how are you going to proceed?)
10. Ls: aah! Tiphalilaniko! (Tell us sir!)
11. R: Yayi chitani namu mwapulikila! (No, do it the way you have understood it!)
12. [Researcher moved away from the group]
13. Ls: A ticha niiyi answer? (Teacher, is this the answer?) [Individual learners approach researcher asking for verification!]
14. R: wasanga wuli? (How did you find the answer?)
15. Ls: Ndiyo answer? (Is this the answer?) A ticha ndiyo? (Teacher, is this the answer?)
16. R: I don't know too. What I want to know is what you did to find that answer!
17. Ls: A ticha namara (Teacher, I have finished) [A member of group 1-6]
   [Researcher asked her the same question he asked the friend]
18. R: Wasanga wuli? (How did you find the answer?)
19. Ls: A pa a ticha – para batola 10 bags mbwenu aba batolenge 20 (Here teacher, if this group takes 10 bags then this village will get 20)
20. R: Chifukwa? (Why?)
21. Ls: A ticha ka aba mbanandi! (Teacher, because these are many!)
22. R: Chifukwa munda bape 18 bags? (Why haven't you given them 18 bags?)
23. Ls: Aaah – (silence) a ticha kasi vikwenda mu folu folu! (Teacher, they are given in groups of 4s) [No one was able to explain the reasoning behind their answers. Meanwhile they were able to get the second and the third tasks correct. They all failed to do the third problem that required them to ascertain how many bags each village would get if government released 24 bags]
24. Ls: A ticha ine (Teacher, me) [She shows the answer 8 and 16 – many had written 12 and 12]
25. R: How did you find this?
26. Ls: A ticha ka aba mbanandi – mbwenu ndiwo batolenge vinandi! (Teacher, because these are many, they are ones who will get more)
27. R: Nanga 9 na 15? (What about 9 and 15?)
28. Ls: A ticha nangu pendesela. Para uku batola 4, mbwenu uko 8, para uku, batola 8, mbwenu uku ni 16 mbwenu yakwana! (Teacher, I counted, when these get 4, these will get 8, then when here they get 8, then these will get 16, then its over!)

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29. Once her work was marked, the other learners started copying from her. Many could not explain how they got the answers. A similar picture obtained for groups 2 and 4, and 3 and 5. The third problem was not done. The learners basically understood the problem. Presentation of the solutions was a problem without a template. They worked out the problems using their informal ways and could not write those in their exercise books? A ticha tilembe mu mabuku? (Teacher, should we write in our books?)

30. R: Yes write in your exercise books [Learners just put answers where the researcher had put question marks. In fact learners copied the question marks too! And wrote next to the question marks their answers]

31. Some sample solutions

<table>
<thead>
<tr>
<th>9litres</th>
<th>?</th>
<th>15 lit</th>
<th>chiduli</th>
<th>Dambo</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>30li</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>40litres</td>
<td>64</td>
<td>?24 lit</td>
<td>10</td>
<td>?20</td>
</tr>
<tr>
<td></td>
<td>?15</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>?12</td>
<td>24</td>
<td>?12</td>
<td></td>
</tr>
</tbody>
</table>
32. "Share 40 sweets between Pamela and Maya in the following ratios
   a) 2 to 3     b) 1 : 3     c) 3 to 5
Sample solutions were as follows;

\[ \begin{align*}
2 + 3 &= 5 \\
40 \div 5 &= 8 \\
1 \times 4 &= 4 \\
1 \times 4 &= 4 \\
1 + 3 &= 4 \\
40 \div 4 &= 10 \\
4 \times 3 \times 4 \times 5 \times 4 &= 3 \times 3 = 9 \times 3 = 12 \\
5 \times 3 \times 2 + 5 &= 4 \\
10 \times 10 &= 100 \\
3 \times 5 &= 15 \\
\end{align*} \]
"Write the following ratios in their lowest terms"

Sample solutions
Appendix B --Pictures from research site

Expert builder showing rectangular house

Grade one learners in a group
Grade six learners in class in a group

Grade one learners seated on the mat in front (Teaching Corner)