ANJUM HALAI AND IRFAN MUZAFFAR

5. LANGUAGE OF INSTRUCTION AND LEARNERS' PARTICIPATION IN MATHEMATICS

Dynamics of Distributive Justice in the Classroom

INTRODUCTION

The policy makers in education, in the post-colonial contexts, often introduce the ex-colonial language with perceived or real power and privilege as a medium of instruction, ostensibly for distributive justice for all learners. Since language of power is part of the cultural capital needed for social mobility, its use in classrooms is assumed to help distribute this capital through formal education. However, such attempts create a paradoxical effect as learners, often from low socio-economic background, face the twin challenge of learning both a language and the subject knowledge (mathematics in this case) presented in that language. The learners are systematically perceived as deficit laden and ultimately marginalized from optimal participation in the course of learning mathematics (Halai, Muzaffar, & Valero, 2015).

In this chapter, we illustrate this paradoxical consequence of language in education policies by examining the case of Pakistan's Punjab province where the state introduced in 2009, English as a medium of instruction in schools serving a largely Punjabi and Urdu speaking population. A major contention of this policy was to distribute the advantage of English language, perceived or real, to all learners in the education system. We illustrate the paradoxes that followed the implementation of this policy by deploying Nancy Fraser's framework consisting of three dimensions of social justice; i.e., redistribution, recognition, and participation in the mathematics classrooms (Fraser, 2008, 2001). Following Fraser we argue that participation in educational processes is not simply a matter of distribution of resources. Rather, it is inherently linked to the politics of recognition of the socially and culturally marginalized learners. We show that learners' cultural resources remain unrecognized in classroom interactions that privilege a language other than their first or a proximate language as the language of instruction, thus resulting in their marginalization. In this paper, first language is used similarly to the term mother tongue to refer to a language that the learners learnt first or they identify with; proximate language refers to a language that is commonly used in the learners' proximate environment and is familiar to them. Based on this analysis, we argue for a more socio-culturally

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embedded and inclusive use of language in the classroom instead of an abrupt move from one language to the other as the language of instruction.

LANGUAGE OF INSTRUCTION AND LEARNERS' PARTICIPATION IN MATHEMATICS: ASPIRING FOR SOCIAL JUSTICE IN PRACTICE

Learners' participation in mathematics has been approached from a variety of perspectives, including the cognitive psychological perspective that looked at learning as construction of knowledge through learner's interaction with the physical and social world (e.g., Piaget, 1959); socio-cultural perspective that looked at learners' participation in and through social interactions employing the tools of culture such as language and symbol systems in mathematics (Vygotsky & Luria, 1994); equity and social justice perspective that seeks to understand learners' participation in terms of their negotiation of social and intellectual space for participation and through teachers' creation of opportunity for all learners irrespective of their language, ethnicity, gender and socio-economic background, to participate in the process of learning mathematics (Atweh & Brady, 2009; Atweh, 2007; Valero & Pais, 2011).

Nearly all of these perspectives assume the differential nature of learners as distributed at various points on a scale of cultural and economic advantage. More often than not, the cultural and the economic are imbricated with each other. For instance, learners who do not share the dominant culture and language are also the ones that come from economically disadvantaged households. Thus the call for making all learners learn better, or providing quality education for all, can be interpreted in terms of a requirement to provide all learners with the tools that are traditionally available only to a few, i.e., to implement a certain kind of distribution of cultural capital to those who don't have it. The notion of cultural capital employed in this paper draws on Bourdieu's perspective, according to which cultural capital is familiarity with the norms of the dominant culture mainly the competence to use language of the educated and higher social class (Bourdieu, 1977). Within this perspective it is not enough to take account of cultural resources such as language or mathematics to which the learners are being introduced, rather the significance is in the norms and practices of use of these resources that collectively constitutes the cultural capital.

Arguably, redistribution of the cultural capital in the form of languages especially a global language like English is a concern for those well intentioned and social-justice oriented decision makers. However, in mathematics classrooms a fundamental concern is or should be to construe the cultural capital to be distributed in terms not of language but of mathematical knowledge and ways of knowing, and seek its distribution to all learners. For the sake of argument, let us substitute mathematical capital for the cultural capital. The mathematical capital, then, would include a combination of mathematical knowledge, skills and attributes that enable learners to succeed in examination (Bourdieu, 1977;

Zevenbergen, 1998). In an increasingly globalized and technological world, such mathematical capital would include application of mathematics knowledge, communication and interpretation of mathematics, problem solving and creativity (Hirsh, 2010). When conceptualized from this perspective, mathematical capital would be different from the traditional emphasis in mathematics classrooms on routine algorithms and procedures.

When education systems use the mother tongue or first language as the language of instruction at pre-primary and early primary level they are not just responding to the insights from scientific research but also to the political imperative to recognize and value the existing cultural capital of the learners. In the case of some countries with multiple major languages in use, one out of the several languages in use is recognized as the national language, which may also be different from the learners' first language or mother tongue but which it is necessary to learn due to its status as the national language. The later introduction of the national language as a language of instruction at elementary or upper primary level of education, and of a global language such as English as the language of instruction (e.g., the case of Tanzania, India) are instances of the ways in which policy attempts to distribute cultural capital (Brock-Utne, 2012; Halai & Karuku, 2013). The language of instruction assumes its status in an intricate web of social, cultural, political, and cognitive preferences. In a world formatted by the current tide of globalization, the language(s) of instruction in the national and sub-national setting is influenced by the patterns of global cultural dominance (Atweh, Clarkson, & Nebres, 2003). Thus, it is not unusual to find the language of instruction in mathematics to be other than the first or the proximate language of the learners. These differences raise new problems for learners' participation in mathematics, making it increasingly difficult for those not competent in the language used as the medium of instruction. Thus learners' proficiency in the language of instruction becomes a key determinant of their ability to participate [or not] in mathematics.

The difference in language of instruction and the learners' first or proximate language is regarded as both a cause as well as an effect of power differential within particular societies. If the disadvantages were solely economic, redistribution of incomes through taxation and philanthropy could make the societies more equal. However, in this case the cultural and economic disadvantages coincide. By privileging a particular culture and language, the education systems do not recognize the cultural resources associated with the learners' first languages. This situation raises issues of social justice for the linguistically marginalized learners.

Fraser's (1997) notion of three key dimensions of social justice, i.e., redistribution, recognition and participation, is a useful way of understanding issues of social justice in education. This framework is often employed at the macro level, where the dynamics of reform are focused on redistributing the benefits of education through improved access to education across the socioeconomic boundaries. However, the framework can also be employed in classrooms where social justice issues are experienced first-hand. For example, in mathematics classrooms distributive

justice would imply equal access by all learners to mathematical capital in the form of knowledge, skills and ideas important for success in mathematics. Likewise, recognition within the classrooms would require that the teachers acknowledge and respect the diverse backgrounds and needs of various individuals and groups such as gender, ethnic or linguistic minorities. Participation from Fraser's perspective means challenging the hierarchical power structures and norms in the classroom so that opportunity is created for all learners to be active learners. Of course a practical implication of this framework at the classroom level would be a pedagogic process that is radically different from the traditional teacher directed pedagogy. Thus Fraser's framework for social justice in education is inherently political in nature (for a further elaboration of social justice in education also see Tikly & Barrett, 2013).

To address issues such as those noted above, Fraser (2001) elaborates that two kinds of remedies are often employed to deal with issues of redistribution and recognition, affirmative "aimed at correcting inequitable outcomes of social arrangements without disturbing the underlying framework that generates them" (p. 82), and transformative, "aimed at correcting inequitable outcomes precisely by restructuring the underlying generative framework" (p. 82). Extending this discussion on social justice with specific reference to mathematics education, Atweh (2007) maintains that none of the three dimensions in Fraser's framework are reducible to the other. Indeed parity in participation can only be achieved if a dialectic relationship is established between redistribution and recognition. In what follows we will illustrate how redistribution without adequate attention to recognition and participation led to a paradoxical situation for the teacher and the learners where the good intentions of the policy makers instead led to consequences for the learners where they learnt neither language nor mathematics.

DISTRIBUTIVE JUSTICE IN ENGLISH MEDIUM MATHEMATICS CLASSROOMS: CASE OF THE PUBLIC PRIMARY SCHOOLS IN PUNJAB

Pakistan is a linguistically diverse country with over 300 dialects and approximately 57 languages spoken throughout the country's four major provinces, and Urdu as the national language and the lingua franca. Despite being designated as the national language, Urdu is the first language of less than 10 per cent of the population (Rahman, 2005). English remains the preferred language due to its status as an abiding colonial heritage and a language that continued to be associated with power and privilege after Pakistan's independence. Schools that offer instruction in English are called English medium schools. These schools, mostly privately managed, are found in both urban and rural areas. Learners in Pakistan's English medium schools learn their subject matter content and the English language simultaneously and are expected to become proficient in both.

There are five main levels in the education system in Pakistan: Primary (Classes K[1] through five, ages 6 yrs.–10 yrs.), middle[2] (Classes six through eight); high school

or matric level (Classes nine and ten) leading to a secondary school certificate, and higher secondary or intermediate level (Classes eleven and twelve) leading to a higher secondary certificate, and finally tertiary education.

Typically mathematics is a compulsory subject that learners have to study throughout the course of their primary and secondary school cycle. Performance in mathematics, however, has been an enduring concern. For example, on the basis of a comparative study of the quality of education in public and private schools in Punjab, Andrabi, Jishnu, Khwaja, Vishwanath and Zajonc (2008) claim that "By the end of class three, just over 50% of the tested children have fully mastered the Mathematics curriculum for grade I. They can add double-digit numbers and subtract single-digit numbers but not much more. They cannot subtract double-digit numbers, they cannot tell the time, and double-digit multiplication and simple long division are beyond reach for all except a small minority" (p. 19). Similar concerns abound about the quality of primary education and especially learners' achievement in mathematics in the country.

Language in education has always been seen as an issue in need of a policy resolution in Pakistan. Since the report by the Shariff Commission in 1959, an influential first document on education policy and those that followed soon after, aimed to distribute to a wider cross section of society, the cultural capital encoded in formal education delivered through the mother tongue and later the national language and ultimately English (Ministry of Education, 1959). Yet, English remained the primary medium of instruction in the elite private schools. More often the children going to these schools also had access to English at home. The policy decisions about language in education in the country, especially about the language of instruction have oscillated from privileging regional languages and Urdu (the national language) as the medium of instruction to using English as the medium of instruction. Since English remained the language in which the state conducted its business, it constituted part of the cultural capital accessible only to a very small elite in Pakistan. This gave rise to high level of inequality in the country.

More recently, the policy has attempted to remediate this situation by making English the language of instruction for all students. The National Education Policy (NEP, 2009) required the use of English as a medium of instruction for science and mathematics in class four onwards. As an example of distribution of cultural capital, the policy sought to provide opportunities for "children from low socio-economic strata to learn English language." (Ministry of Education, 2009, p. 28). In 2009, the provincial government in Punjab, the largest and arguably the most developed province, followed up on the NEP by introducing English as language of instruction in its schools at the primary and secondary levels. In compliance with this policy several textbooks, teacher guides and assessment were rendered into English for use by teachers and learners.

Implicit in this change in language of instruction policy were two main elements typical of a redistributive motivation. First, was the perception that English is the language of power and opportunity and all learners needed to become proficient

in English. Second, a change in the language in education was expected to result in social justice through redistribution of the cultural capital, mainly comprising of access to English, to the disadvantaged and marginalized sections of the society.

THE LANGUAGE IN EDUCATION PROJECT

This present chapter draws from a large project carried out in six selected districts of Punjab to investigate the extent to which introducing English as language of instruction supports quality teaching and learning in public primary schools. Here it must be noted that Punjabi language, together with its several dialects, is the mother tongue of most learners in Punjab. Yet Punjabi has never been used as a medium of instruction. The schools were either English or Urdu medium until the decision of the government of Punjab to introduce English as the language of instruction in all schools. The study involved classroom observations in schools implementing the new policy. The observations were undertaken in a total of 126 primary classes in English, science and mathematics in public primary schools where English had been introduced as a language of instruction. Transcripts of lesson observations were read and coded under the following emergent categories:

a. Utterance in Urdu;
b. Utterance in English;
c. Mixed Utterance;
d. Teachers' imperative prompts for management of behavior;
e. Teachers' procedural instructions in mathematics;
f. Questions posed by the teacher.

In addition interviews were conducted with teachers, head teachers and parents (For details about the study see Rashid, Muzaffar, & Butt, 2013).

Specifically this chapter draws on the quantitative discourse analysis of teacher and student talk as reported in the project report and the transcripts from mathematics classrooms (n=41). These transcripts were analyzed on the basis of Fraser's framework to understand the extent to which learners were able to participate in mathematics in the context of classrooms where the language of instruction was not the first or the second language of the teachers and the learners. In the section that follows we present the key findings together with illustrative data.

CREATING SPACE FOR LEARNERS' PARTICIPATION

An overall pattern borne out in almost all the lessons observed was the three-phase lesson structure. Phase one was introductory where the teacher reviewed or referred to the previous lesson and introduced the topic of the new lesson. Phase two was the main body of the lesson where the teacher explained a mathematical procedure or the concept that was the topic of the day. During this phase the textbook and the chalkboard were the main resource for teaching. The third phase invariably meant

that learners worked in their notebooks at tasks taken from the textbook but similar to those introduced by the teacher in the main body of the lesson.

In terms of verbal interactions there was opportunity for learners to participate in phase one and phase two of the lessons. Quantitative analysis of teacher talk showed that teachers typically used a mix of Urdu and English with Urdu as the main language of the classroom discourse; 62% of all teacher utterances were using this mixed mode. When learners did participate in the interactions they seldom uttered a full sentence in English, except when asked to read from the textbook. Full sentences in English constituted only 5% of all learners' utterances, all of which were reading from the textbook.

Observations also showed that a significant corpus of the mathematics lessons comprised of teaching procedures and routines for computation (e.g., sum or product of fractions, HCF), measurement (e.g., area, perimeter). A relatively small corpus of the mathematics lessons observed comprised of "word problems." Certain key features emerged in both these genres that raise questions about the extent to which the policy aspiration of social justice in the classroom was met. In teaching mathematics procedures, an emphasis was to ensure that learners know the names of mathematics terms in English. This emphasis was also present in lessons on 'word problems', where a significant effort to introduce names of mathematics terms in English was prevalent. In addition, it was noticeable that teachers tried to convert the 'word problems' into specific procedures and routines by recognizing key words or phrases that could provide a hint of the mathematics operation to employ. Illustrative data extracts are provided from both genres of mathematics lessons in the corpus.

Data Extract One

Provided below is an extract from a lesson in class four. The teacher (T) introduced the topic of Highest Common Factor (HCF) by Prime Factorization and worked on the chalkboard to demonstrate to the learners (L) the procedure for deriving the HCF of 50 and 75 by Prime Factorization.

1. T: Bachon kal hum nay kya parha? [Children what did we study yesterday?]
2. L: HCF (Chorus)
3. T: HCF ka matlab kya hai? [What is the meaning of HCF?]
4. L: Highest Common Factor (Chorus)
5. T: Aaj hum nay parhna hai HCF by Prime Factorization. —ki choti choti tajziyan banti hain. [Today, We have to study HCF by Prime Factorization – small small factors are made]

In line 3 above the teacher asked the learners to provide the "meaning" of HCF. But line 4 shows that learners simply gave the full name of the mathematical term HCF. Teacher's acceptance of the full name in English was symptomatic of an emphasis on learning mathematical names in English without necessarily probing the meaning that learners made of those terms. In line 5 the teacher made a pedagogic move by

introducing the topic of "HCF by prime factorization". In the same line she stated that, "small small factors are made" (choti choti tajziyan banti hain). Presumably, "small small factors" referred to prime factors as 'small' because they cannot be further factorized. Of course, small (choti) can be interpreted in a number of ways and not all of them would lead to this conclusion. Additionally the word 'tajzian' has its root in tajzia that means to analyse or split apart. A use of tajzian could potentially provide the learners with a conceptual link to the notion of factors. It is noteworthy that an attempt to explain prime factorization, however limited and inaccurate, was made in Urdu.

To continue with the lesson above, interactions from line 6–25 (full transcript in Appendix A) showed that the teacher worked on the chalk board through the procedure of finding the HCF of 50 & 75 by taking their prime factors. She found the prime factors of 50 (2, 5, 5) and of 75 (3, 5, 5) and then the common factors (5, 5) and the highest common factor (25). Once completed she set the class to do similar work in their notebooks.

This is an instance of interactions that were dominated by the teacher and did not involve meaningful participation by the learners where they don't just learn mathematical procedures and their names in English, but could also have had an opportunity to learn concepts and mathematical relationships. For example, the teacher accepted the learners' response in line 5 and moved towards introducing the topic of the day 'HCF by Prime factorization.' However, it showed no evidence of learner's engagement with mathematics concepts, ideas and relationships around highest common factors and prime factors. While, some of the issues illustrated in the data are about pedagogy that emphasized procedures above concepts and relationships, they were compounded due to an additional effort required by the teacher and the learners to become familiar with mathematics terms in English.

In extract two below, we see that similar patterns of procedural discourse persist in a lesson with a focus on word problems.

Data Extract Two

In this lesson in class four the topic is "statement problems" also known as word problems. The class was working on the problem as read by one of the learners "Amna bought four point fifty (sic) (4.50) metre of cloth. Ayesha bought ten point fifty (sic) (10.50) metres of cloth. How many metre of cloth did they both buy?"

1. T: Statements kaay savalaat hain. [(These are) questions with statements]
2. L: Miss mein Parhun. [Miss may I read]
3. T: Chalain beta koi parhay-yeh statement parhain-savaal number eik ki-ji [OK child one of you read the statement of question number one-yes (points towards one learner)]
4. L: (Reading from the book). Amna bought four point fifty (sic) matter of clothes
5. T: Metre, matter nahi metre. [Metre, not matter, metre]

6. L: Metre. Ayesha bought ten point fifty (sic) metres of clothes (sic). How many metres cloth did they both buy?
7. T: Jee. [Yes]
8. L: Eik Jaisa. [Alike]
9. T: Metre, matter nahi metre. [Metre, not matter, metre]
10. L: Plus (chorus)
11. T: Bachon dono ka kya matlab hai? [Children what is meant by 'dono']
12. L: Plus (chorus)
13. T: Bachon dono ka kya matlab hai [Children what is meant by 'dono']
14. L: Ten?
15. T: Dono ko aapnay kya karna hai? Plus karna hai, minus karna hai, multiply karna hai, divide karna hai?[what do you have to do to both? Plus, minus, multiply or divide?]
16. L: Four point five, aur (and) ten point fifty (sic)

In the extract above, the teacher attempts to convert the process of problem solving into a procedure for identifying 'key words' in the statement of the problem and converting them into commands for mathematical procedures.

In line 11, 13, and 15 the teacher directs learners' attention to the word "dono (both)" and prompts them to use the word "dono (both)" to identify the operation—plus, minus, multiply or divide—that should be carried out to provide a solution to the problem. Learners have already got the idea and are shouting "plus" (line 10, 12). In line 16 they offer the two values that are to be added.

From line 20–29 (Appendix B), she takes the class through the procedure of addition of decimal numbers (4.50 and 10.50) by cautioning them to vertically align the decimal points by placing one below the other (line 27). Working through the procedure, in line 30, learners offer the correct answer fifteen point zero zero. However, they do not offer the unit of length and she prompted them to do so in line 35.

Moreover, learners utter choral brief responses, mainly consisting of mathematical terms or numbers, in response to the teachers' prompts and procedural instructions. The only instance of a complete and extended contribution in English was when one learner read the statement of the problem. The learner mispronounced the word "metre" as "matter" and the teacher corrected her pronunciation.

The above extract was illustrative of a pervasive pattern in teaching solution of word problems. Teachers prompt learners to focus on a key word or phrase in the problem statement that provided a clue to the operation to be used in solving the problem. However, in multilingual classrooms, such as the one shown here, it involved an additional process of translation. Hence we saw that the word "both" was translated as "dono" which could mean 'the two combined' or 'first and second numbers together.' Some learners interpreted "dono" as a signal to combine or plus (line 10 & 12). While others interpreted it as first and the second number, "four point five zero and ten point five zero" (line 16 & 18). The teacher accepted "Plus"

as the correct answer (line 19) and moved ahead with adding the two numbers 4.50 and 10.50. However, had she accepted the second answer provided by the learners "four point five zero and ten point five zero", it is likely that learners would have had to justify explicitly the decision to add the numbers. In the extract above, it remained unclear whether or not all learners recognized the reason for taking the decision to plus.

Locating the two illustrative extracts within Fraser's framework, the focus in the classroom interactions was on ways of naming terms in English language so that the mathematical capital in terms of conceptual knowledge and mathematical relationships was not being distributed to the learners. Participation was limited in nature to 'safe talk' with little evidence of conceptual learning. Significant conclusions and recommendations can be drawn for a dynamic that would support the social justice intentions of the policy of language of instruction when implemented in the classrooms.

DISCUSSION AND CONCLUSIONS

A key conclusion is that the policy aim of redistribution of cultural capital including knowledge of mathematics and proficiency in English, did not appear to be achieved because the policy positioned English in a position of power and did not recognize the teachers' and learners' marginalized position as non-English speakers. As far as the language in use was concerned, it was evident that neither the teacher nor the learners could use English for meaningful communication. While the policy required the use of English, what came across as English in practice was merely names of mathematical concepts. If the policy aimed at distributing *English* as the cultural capital, it was clearly failing in achieving this aim.

What was of greater concern in mathematics classrooms was the lack of evidence about transfer of mathematical capital. Nature of interactions showed that the classroom talk was mainly in the realm of procedural discourse of mathematics. For example, the teachers' questions were limited to asking students to apply procedures and learners' contributions and questions were concerned with taking the procedures forward. While, emphasis on a procedural discourse was not entirely due to learners' and teachers' lack of proficiency in the language of instruction, the procedural dictations were arguably 'safe talk' which were strategies to escape from the difficulties of engaging in meaningful communication in a second or third language (Chick, 1996). More significantly, when safe talk dominated classroom interactions, little cultural capital was traded between teachers and learners.

It was reasonable to expect that in the course of teaching and learning processes, learners' participation would be reflected in the quantum of their contribution and in the quality. However, the profile of language use in this case showed that the students were largely mute. This pattern of students' lack of participation was not limited to this lesson but was noted throughout all the observed lessons. As noted in the data on overall interaction patterns, learners seldom uttered a full sentence in English,

i.e., only 5% of all the utterances, and that too usually when asked to read something from the textbook. The mixed language utterances typically involved substitution of Urdu by English terms inserted in sentences in Urdu. In short, learners were not engaged in meaningful mathematical communication. The learners were neither learning English nor mathematics. However, acquiring academic knowledge and higher order thinking is not just a cognitive function, it is also dependent on the tools of thinking that were provided by culture, mainly being the language. Situated within the context of the social justice framework, the extent and nature of participation actually marginalized the linguistically marginalized twice over. Not only were they denied the opportunity of exposure to use of acceptable acadamic language of instruction, they were also marginalized from a conceptual discourse in mathematics. Essence of social justice from Fraser's perspective was in parity of participation, according to her "overcoming injustice means dismantling instutionalized obstacles that prevent some people from particpating on a par with others as full partners in social interaction "(Fraser, 2008, p. 16). At the level of the classroom, instutionalized obstacles were those cultural norms and patterns of engagement that denied access to the learners to resources essential for interaction with their peers. Significanlty these resources included the language(s) that formed the collective cultural captial in the classroom and forms of mathematical knowledge essential for their success in examination and beyond. In the context of the case study being considered, the policy of English as a language of instruction had however inadvertantly further entrenced those obstacles by not recognising the cultural and linguistic diversity of the learners.

Several recommendations could be made to enable the social justice aspriations implicit in the current policy of language of instruction so that learners benefit from a meaningful participation in learning and transfer of mathematical capital. First, for parity of participation in the classroom interactions the structural hierarchies in the relationship of learner and teacher would need to be questioned. As it stands the classroom dynamics were tightly controlled through a structured pedgagic practice with implicit norms that did not necessarily empower the learners. For learners marginalized due to language and culture or other forms of exclusion (e.g., gender, social class, disability) teaching and learning strategies would need to be adapted to enable a wider participation through creating space in the classroom dynamics for learners' voice to be heard (Tikly & Barret, 2013).

Second, an assumption underpinning the language of instruction policy was that all the education processes would be conducted in the target language once the policy was mandated. This assumption was reflected in the prescribed textbooks that were written in English and the end of year examination that learners were expected to write in English. In the classroom all 'official processes' were conducted in English, these include the work on the chalkboard, setting of assignments for learners to do in their notebook, and in-school examination. However, classroom interactions showed that learners and teachers employed Urdu to negotiate mathematics problems encoded in English. Street (2003) proposes a view of language as a "socially situated practice

and recognizes the diversity in language as a resource and an approach to democratize the educational process and contribute to greater equality and opportunity" (p.134). An implication of this theoretical positioning is to problematize the assumption that teachers and learners bring clearly defined systems of language in classrooms because language in practice is fluid, moves across boundaries and takes meaning in context.

To conclude, in mathematics classroom, developing learners' participation in mathematics is the valued ideal, and redistribution of linguistic capital could support learners' participation in mathematics if it recognised the differentiated backgrounds, experience and needs of the mathematics learners. A nuanced interpretation and implementation of the language of instruction could mean that learners' first or proximate languages are seen as a resource that the teachers could employ to facilitate the participation of learners in the process of learning. This recognition would not simply be a technical change introduced through teaching techniques but would entail a different mindset to accommodate the learner as a participant. Deep seated assumptions about appropriate language and pedgogic practices would need to be challenged for transformative social arrangements in the classroom.

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NOTES

[1] In some schools the traditional 'kutchi class' is offered to prepare learners for schooling. The primary school age 6-10 yrs., is given in NEP 2009. Other sources note the age as 5-9yrs.

[2] According to the Education Policy 2009, the Primary and Middle school levels are being merged to form the Elementary Level (Classes one-eight).

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APPENDIX A

1. T: Bachonkal hum nay kya parha? [Children, What did we study yesterday?]
2. L: HCF (Chorus)
3. T: HCF ka matlab kya hai? [What is the meaning of HCF?]
4. L: Highest Common Factor (Chorus)
5. T: Aaj hum nay parhna hai HCF by Prime Factorization. —ki choti choti tajziyan banti hain. [Today, We have to study HCF by Prime Factorization—small small factors are made]
6. T: Sab say pehlay 2 aab 2 par iss ko taksim karna hai [First 2, Divide this [number] by 2].
7. T: 2 par yeh taksim nahi hua [This [number] was not divisible by 2]
8. T: Aab 3 par isko taksim karna hai [Now divide this [number] by 3].
9. T: 3 par yeh taksim hogaya [This [number] was divisible by 3]
10. T: 2—nikalay 75 teen par taksim hogaya [75 was divided by 3]
11. T: unintelligible
12. T: 3 multiply 5, 3x5=15 [Number facts in English]
13. T: Yeh 3 par taksim hogaya- aab 75 kaay, factor of 75 liktay hain [This was divided by 3. Now we write the factor of 75]
14. T: Yani iskaay 3x5x5=75 [So, its factors are…number facts written].
15. T: Aab hamnay HCF nikala tau hum aab iss kaay common factor likhain gay [Now we have to find HCF…we will write the common factors]
16. T: Common factor hain? [Common factors are? *A prompt*]
17. T: Common kaun kaun say hain? [Which ones are common?]
18. T: Idhar 2 hain idhar 2 nahi hai [2 is here, but 2 is not there]
19. T: Idhar 3 hai aur idhar 3 nahi hai [3 is here, 3 is not there]
20. T: Idhar 5 hai aur idhar bhi 5 hai [5 is here, 5 is also there]
21. T: Yeh common hain, 5x5=25 [These are common…number facts]
22. T: aab yah common hain [Now these are common]
23. T: Humain common factor mil gayaye hain [We found the common factors]
24. T: Aab humain inka HCF nikalna hai. [Now we have to find the HCF]
25. T: 5 ko 5 kay sath multiply kariain gay tau humara HCF nikal aya [multiply 5 by 5 and we have our HCF]
26. T: HCF kya hai 25 [What is HCF? 25]
27. T: Samjh aya saval? [Did you understand?] Dobara duhrana hai? [Repeat it?]
28. T: HCF kya hai? [What is HCF?]
29. L: Highest Common Factor. (Chorus)
30. T: [–]
31. T: Agla saval likhain 70, 49 [write next question 70, 49]
32. T: Bana logay? [will you be able to do it?]

APPENDIX B

1. T: Statements kaay savalaat hain. [*(These are) questions with statements*]
2. L: Miss mein Parhun. [*Miss may I read*]
3. T: Chalain beta koi parhay-yeh statement parhain-savaal number eik ki-ji [*ok child one of you read the statement of question number one-yes (points towards one learner)*]
4. L: (Reading from the book). Amna bought four point fifty matter of clothes
5: T: Metre, matter nahi metre. [*Metre not matter metre*]
6. L: Metre. Ayesha bought ten point fifty meters of clothes. How many meters cloth did they both buy?
7. T: Jee. [*Yes*]
8. L: Eik Jaisa. [*Alike*]
9. T: Metre, matter nahi metre. [*Metre not matter metre*]
10. L: Plus (chorus)
11. T: Bachon donoka kya matlab hai? [*children what is meant by 'dono'*]
12. L: Plus (chorus)
13. T: Bachon donoka kya matlabhai? [*children what is meant by 'dono'*]
14. L: Ten?
15. T: Dono ko aapnay kya karna hai? Plus karna hai, minus karna hai, multiply karna hai, divide karna hai? [*what do you have to do to both? Plus, minus, multiply or divide?*]
16. L: Four point five, aur ten point fifty
17. T: Ji plus karna hai-donoka kya matlab hai? [*yes you have to plus- what is meant by 'dono?*]
18. L: Four point fifty aur ten point fifty
19. T: Plus dono-theek hai-vo likh raha hai Amna bought four point fifty meters of clothes. Amna ney kitna kapra khareeda? 4.50 metre, theek hai? Ayesha bought? Kitna karpra khareeda? [*Plus both, all right? It is written that Amna bought four point fifty meters of clothes. How much cloth did Amna buy? 4.50 metre, all right? Ayesha bought? How much cloth (did she) buy?*]
20. L: Ten
21. T: Ten point fifty meters
22. L: zero zero zero
23. T: How many clothes both buy? Dono nay kitna kapra mil kar khareeda? [*how much cloth did both buy altogether?*]
24. L: Ten
25. T: Aap nay kis kis ko plus karna hai? [*which ones do you have to plus*]
26. L: five
27. T: Point kaay neechay point hoga-yeh 50 vaisay hi aagaya aur yehan yeh kya aayay ga-10 [*place point under the point- 50 will come as it is. What will come here, 10*]

28. L: .1 Aisay hi one [*.1 as it is. 1*]
29. T: Theek hai aab aap inko pura karlain [*all right now you complete it*]
30. L: Fifteen point zero zero
31. T: Zero zero zero
33. L: Fifteen hundred
34. T: Five five?
35. L: Fifteen metre
36. T: Zero 1 carry ka hai-point kaay neechay point aa gaya. Point four or one [*Zero, 1 is for carry over, place the point under the point. Point four or one*]
37. L: Miss mei