

BEING INCLUSIVE OR REINFORCING OF SOCIAL STEREOTYPES

THE CASE OF KERALA STATE BOARD MATHEMATICS TEXTBOOKS

SER INCLUSIVO OU REFORÇAR OS ESTEREÓTIPOS SOCIAIS

O caso dos livros de matemática do Conselho Estadual de Kerala

SER INCLUSIVO O REFORZAR LOS ESTEREOTIPOS SOCIALES

El caso de los libros de textos de matemática de la Junta Estatal de Kerala

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ABSTRACT

Textbooks function as an important resource for teaching and learning of mathematics at the school level across the world. At least at the primary grades the contents of textbooks are situated in the larger society around the learners, in order that the learners can relate to what is taught to them. This opens the possibility for textbooks to uncritically reinforce the prevailing stereotypes or use the opportunity textbook provide to creatively break the stereotypes. Mathematics education research has engaged with the question of gender stereotypes in mathematics textbooks which has had an impact how gender figures in textbooks. However, gender is neither a binary nor monolithic. In the Indian context, gender is not the only social hierarchy that operates. The National Curriculum Framework 2005(hence forth referred to as NCF 2005) addresses the question of prevailing stereotypes about children from social margins and says care must be taken to ensure that the curriculum, textbooks and classroom interaction do not reinforce the stereotypes. Moreover, in the last two decades transgender people have been able to demand recognition and acceptance at least in the higher educational spaces as transgender people. Given these, it would be important to understand how textbooks reflect the changes and demands. This paper analyses the content of the mathematics textbooks developed by the State Council of Education Research and Training (SCERT) of one Indian state, namely Kerala, to understand how they represent gender, caste, class and religious differences and to investigate if the textbooks are inclusive of the disabled learners. Based on the content analysis of the textbooks the paper argues that even as the textbooks try to ensure representation of both girls and boys in the pictures and word problems and make an attempt to be inclusive of different religions and marginalised cultures (for example by incorporating the picture of Theyyam, which uses an art form of the marginalised people in Kerala) in a textbook, they end up strengthening the existing gender, class, religious stereotypes. It also draws attention to the complete absence of disabled children in the textbooks.

RESUMO

Os livros didáticos funcionam como um recurso importante para o ensino e aprendizagem da matemática em nível escolar em todo o mundo. Pelo menos nas séries primárias, os conteúdos dos livros didáticos estão situados na sociedade mais ampla em torno dos alunos, para que os alunos possam se relacionar com o que lhes é ensinado. Isso abre a possibilidade de os livros didáticos reforçarem acriticamente os estereótipos predominantes ou usarem a oportunidade que os livros didáticos fornecem para quebrar criativamente os estereótipos. A pesquisa em educação matemática envolveu-se com a questão dos estereótipos de gênero nos livros didáticos de matemática, o que teve um impacto sobre como o gênero aparece nos livros didáticos. No entanto, gênero não é binário nem monolítico. No contexto indiano, o gênero não é a única hierarquia social que opera. O National Curriculum Framework 2005 (doravante referido como NCF 2005) aborda a questão dos estereótipos predominantes sobre as crianças das margens sociais e diz que deve-se tomar cuidado para garantir que o currículo, os livros didáticos e a interação em sala de aula não reforcem os estereótipos. Além disso, nas últimas duas décadas, as pessoas transexuais conseguiram exigir reconhecimento e aceitação pelo menos nos espaços educacionais superiores como pessoas transexuais. Diante disso, seria importante entender como os livros didáticos refletem as mudanças e demandas. Este artigo analisa o conteúdo dos livros didáticos de matemática desenvolvidos pelo Conselho Estadual de Pesquisa e Treinamento em Educação (SCERT) de um estado indiano, a saber, Kerala, para entender como eles representam diferenças de gênero, casta, classe e religião e para investigar se os livros didáticos são incluindo os alunos com deficiência. Com base na análise de conteúdo dos livros didáticos, o artigo argumenta que, mesmo quando os livros didáticos tentam garantir a representação de meninas e meninos nas imagens e nos problemas de palavras e fazem uma tentativa de incluir diferentes religiões e culturas marginalizadas (por exemplo, incorporando o imagem de Theyyam, que usa uma forma de arte das pessoas marginalizadas em Kerala) em um livro didático, eles acabam fortalecendo os estereótipos religiosos, de classe e de gênero existentes. Chama a atenção também a completa ausência de crianças com deficiência nos livros didáticos.

Palavras-chave: livro didático. educação matemática. estereótipos de gênero. contexto indiano.

RESUMEN

Los libros de texto funcionan como un recurso importante para la enseñanza y el aprendizaje de las matemáticas a nivel escolar en todo el mundo. Al menos en los grados primarios, los contenidos de los libros de texto se sitúan en la sociedad más amplia que rodea a los alumnos, para que los alumnos puedan relacionarse con lo que se les enseña. Esto abre la posibilidad de que los libros de texto refuercen acriticamente los estereotipos predominantes o utilicen la oportunidad que brindan los libros de texto para romper creativamente los estereotipos. La investigación en educación matemática se ha ocupado de la cuestión de los estereotipos de género en los libros de texto de matemáticas, lo que ha tenido un impacto en la forma en que el género figura en los libros de texto. Sin embargo, el género no es binario ni monolítico. En el contexto indio, el género no es la única jerarquía social que opera. El Marco Curricular Nacional 2005 (en lo sucesivo denominado NCF 2005) aborda la cuestión de los estereotipos predominantes sobre los niños de los márgenes sociales y dice que se debe tener cuidado para asegurar que el currículo, los libros de texto y la interacción en el aula no refuercen los estereotipos. Además, en las últimas dos décadas las personas transgénero han logrado exigir reconocimiento y aceptación al menos en los espacios educativos superiores como personas transgénero. Dados estos, sería importante entender cómo los libros de texto reflejan los cambios y demandas. Este artículo analiza el contenido de los libros de texto de matemáticas

desarrollados por el Consejo Estatal de Educación, Investigación y Capacitación (SCERT) de un estado indio, a saber, Kerala, para comprender cómo representan las diferencias de género, casta, clase y religión e investigar si los libros de texto son inclusivos de los estudiantes discapacitados. Con base en el análisis de contenido de los libros de texto, el documento argumenta que incluso cuando los libros de texto intentan garantizar la representación de niñas y niños en las imágenes y los problemas verbales y hacen un intento de incluir a las diferentes religiones y culturas marginadas (por ejemplo, incorporando la imagen de Theyyam, que utiliza una forma de arte de las personas marginadas en Kerala) en un libro de texto, terminan fortaleciendo los estereotipos religiosos, de clase y de género existentes. También llama la atención sobre la total ausencia de niños discapacitados en los libros de texto.

Palabras clave: libro de texto. educación matemática. estereotipos de género. contexto indio.

Introduction

In the context of school education, textbooks play a significant role. They constitute a standard source of information and an instrument for teaching and learning. Textbooks give a framework and guidance for teachers to shape the teaching and learning experience along the lines of a prescribed curriculum. In the Indian context the curriculum and the syllabus are set by the National Council of Education Research and Training (NCERT) and by State Council of Education Research and Training (SCERT) of each state. They also bring out the textbooks which are used by public funded schools and made available for children free of cost. Private schools may use either the textbooks brought out by the state or use textbooks brought out by private publishers following the syllabus and norms set by either NCERT or a SCERT. Krishna Kumar discusses how textbooks dominate the curriculum in the Indian education system tracing its history back to the objectives of colonial education during the British rule in India (Kumar, 1986). It must also be emphasized that for a large number of children in India, textbooks are perhaps the only books they get to see as source of knowledge, as there may be no libraries available in the neighbourhood and there may be no family including ones own where books are available.

Primary grade textbooks use a lot of colourful pictures and illustrations to provide a context for the content children are supposed to learn. Highlighting the value of illustrations in the first-grade textbooks Pesikan and Marinkovic say

Illustrations are the most striking means for attracting the readers' attention, arousing interest for a book, taking them to particular contents, "emphasizing important components of the content and, finally, for reporting information that could only partly be reported by verbal means" (Pešikan, A., & Marinković, S, 2006, pp-386)

In the case of mathematics, in the primary grades, textbooks use stories and colourful pictures as contexts to introduce counting, adding and subtracting, measuring and so on. To the extent that the contents of the textbooks are situated in the larger social context they cannot be considered as neutral because they reflect some of the values and beliefs of society. Therefore, the question of 'to what extent a mathematics textbook reinforces prevailing stereotypes' becomes important to investigate. In this paper we analyse the mathematics textbooks brought out by the Kerala State Council Board of Education Research and Training for grades 3 and 4 to understand if they reproduce stereotypes.

Kerala is a coastal state in the southwest end of India. According to the reports from National Statistical Office (NSO) Kerala has literacy rate of 96.2% (NSO 2019, p-68). Being on the west coast, Kerala has had trading links with west Asian and European countries for several centuries and as a result Christianity and Islam came to the state much before they came to rest of India. Kerala is a religiously diverse state with roughly 54% of the state population following Hinduism, 26% Islam and 18% Christianity. It had social reform movements which challenged caste-based discrimination and has people's science movements such as Kerala Sasthra Sahitya Parishad (KSSP). Kerala is also one of the

first states to have a policy upholding the constitutional rights and promoting the education, employment and welfare of transgender people in India. In fact, certain sections of the state would consider Kerala to be a model state that others should follow, though some scholars contest such claims (Devika, 2010, Pillai, 2014). Given this background it would be important to see to what extent the mathematics textbooks brought out by the state reflect a commitment to challenging gender and social stereotypes.

A brief review of literature

There is more than four decades of research that study gender-stereotype in mathematics textbooks with one of the earliest works comparing gender stereotypes in the mathematics textbooks of the 1940-50's with the books of the 70's (Iwata, 1976). Owing to the limitation of space, and the extensive literature available on the topic, we will not present an exhaustive review of literature but only refer to a couple of them. Recently Incikab & Ulusoy (2019) analyse contents in the mathematics textbooks from Australia, Singapore, and Turkey and examine gender bias and stereotypes. The authors observe that gender stereotypical roles are assigned to people: domestic works are "ascribed" to females; works that need intellectual and technical labour are associated with males. Yasin et al. (2012) through analysing contents in mathematics textbooks in Qatar primary schools (Grades 1-6) conclude that there is a tendency to show linguistic sexism and gender stereotyping in the textbooks. One of the most recent publications studies the implicit gender inequality present in the Chinese mathematics textbooks and relates it to Confucianism (Ling, 2023). Another recent publication by Guichot-Reina and Torre-Sierra (2023) looks at the Spanish mathematics textbooks for elementary education analyses 1353 pages from six mathematics textbooks and gives a detailed account of how gender stereotyping figures in the cultural references where women are portrayed as either in literature or in sports while men are portrayed in great variety of roles; in the social roles women are portrayed as taking care of homes while men are portrayed as care giver only when it was in a remunerative role as a nurse or something similar; men and women are portrayed as using mathematics in shopping but gender stereotype figures in what they buy. There are only very few research publications available on stereotypes in mathematics textbooks the Indian context. Nag Chowdari (2022) analyses the voice, structure, and context from primary mathematics textbooks associated with the Indian national curriculum framework and observes that "they use a radically unique voice to introduce school mathematics while also attempting to use authentic and socially relevant contexts within their tasks." As the states were expected to revise their curriculum along the lines of NCF2005, Kerala state came up with a curriculum framework in 2007.

Theoretical framework and methodology

This paper draws on queer theory as its broad theoretical framework. Queer theory challenges the notion of identities and categories as fixed (Dubbs, 2016). For example, rather than seeing one's gender identity as fixed and finite (male, female, transgender) it allows for gender identity to be fluid and flexible. Queer theory questions not only the neat categorization of gender but it also challenges the prevailing binaries of all kinds. Queer theory has been used to interrogate curriculum and pedagogy in mathematics education. Reviewing the work of Sykes, Heather Mendick (2014) one of the first mathematics educators to use queer theory in mathematics education says, the term 'queer bodies' does not once again introduce another binary of bodies that are queer and those that are not. Rather it refers to the experience of their body as non-normative because of the racialized gender, sex, sexuality, physical dis/ability, body shape and size (Mendick 2014, pp 334). In the context of pictorial representation in textbooks that seek to be inclusive, queer theory allows us to critically examine what normative notions are employed how they contribute to fixing rather than breaking stereotypes. The paper adopts the method of textbook content analysis to systematically analyze the pictorial and textual content of grade 3 and 4 mathematics textbooks for stereotypes. Pictures and text were studied carefully to understand what codes were used by the textbooks to convey the gender, class and religious background of the learner.

Observations and Key Findings

The grade 3 and 4 mathematics textbooks use pictures and texts to invoke contexts familiar to the learners to communicate mathematical concepts. Homes, schools, playgrounds, cultural events, workplace, shops and such become the contexts with people playing various roles. These context offer an opportunity to challenge or reinforce prevailing stereotypes. In the following we will show instances of how textbooks reinforce rather than challenge stereotypes.

Reinforcement of Gender stereotypes

The compulsive need for assigning sex (male or female) to a person can be found in textbooks, through the use of pronouns (he/she), and gender specific dress code. For portraying girls and women, the pictorial codes used are one or more of the following: dress (skirt and top, frocks, saree, salwar- kurtas with dupatta, hijab), long hair, and ornaments (bangles, anklets, and earrings). Boys are shown as wearing shorts or pants and shirts and their hair style show a typical boy-cut. Men are shown as wearing either the traditional mundu or a pair of trousers and shirt or vests. Hats and belts are used to denote males. Figure 1: (a) shows a girl (made clear by use of the pronoun ‘her’) and her father in a School Bazar. In figure 1: (b) the public speaker is a male made clear by his attire and by use of the pronoun ‘he’.

Summer vacation is almost over. Reena and her father are at the school bazar.

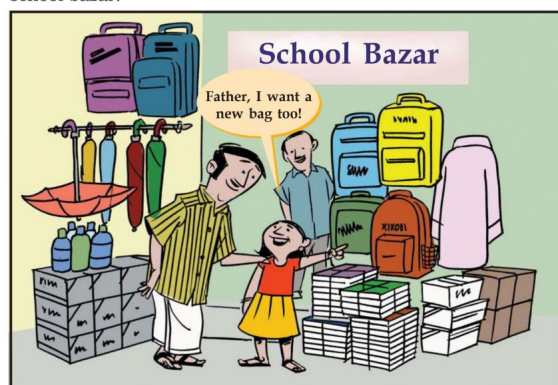


Figure 1: (a) SCERT. (2016a), p-7 (b) SCERT. (2016), p-85

How many seeds?

The Farm Club got bitter-gourd seeds from the Krishi Bhavan. Sana and Latha looked at the packets they got.

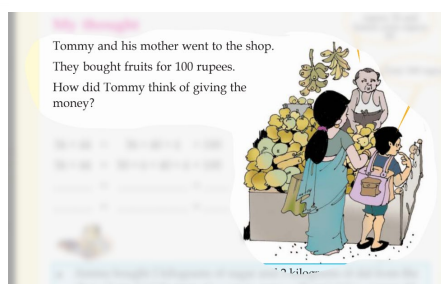
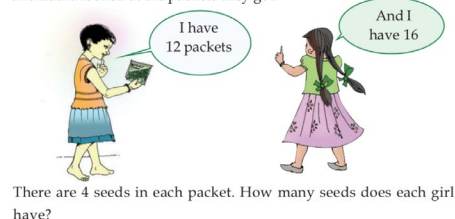


Figure 2:(a) SCERT (2015), p-18

(b) SCERT(2016), p-22

In figure 2 (a) the text says, ‘each girl’ and the picture makes it clear through the use of skirt, top, bangles, and earrings. Similarly, Tommy in figure 2 (b) is a boy, and is portrayed as having short hair, wearing a shirt, and shorts while his mother is portrayed as wearing a saree, long hair, bangles, and earrings.

One can also observe an obsession with assigning gender in the word problems. In the following, the problems leave no scope to ignore the cyclist’s gender or for students to wear gender neutral clothes.

“Raju, the circus cyclist starts his act at 6:15 am and ends it at 9:30 pm. For how many hours does he ride?”
(SCERT. (2016a), p-34)

“Arya's class has 22 boys and 18 girls. Each boy needs 1 meter and 20 centimeters for shirt, and 90 centimeters for shorts; each girl needs 1 meter and 10 centimeters for shirt, and 1 meter and 90 centimeters for skirt. How much of each kind of cloth should be bought?” (SCERT. (2015), p-28)

Further observation using these codes shows us that the activities assigned for each gender, also reinforce gender stereotypes. Passive observers in these pictures happen to be girls while boys are shown as engaged in activities. Just as Guichot-Reina and Torre-Sierra (2023) argue in the case of Spanish mathematics textbooks, in the case of Kerala mathematics textbooks too, women are portrayed in stereotypical roles, mainly as teachers or doing household jobs while men are portrayed in a variety of jobs such as conductor, shopkeeper, etc., and boys/men lifting heavy things while girls/women do not.

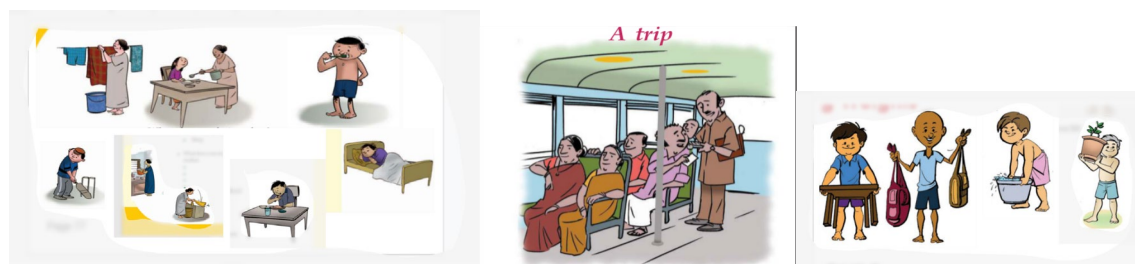


Figure 3: (a) SCERT (2016), p77 (b) SCERT(2016a), p61(c) SCERT(2015), pp45

Reinforcement of notions about social class and skin-color

The article by Sheth et al. (2021) reveals the beliefs about skin color and gender embedded in the Indian Cinema. It discloses the history of color differences in the power structure of India.

“The powerful image of lighter skinned peoples called Aryans invading India and setting fire to the settlements of darker-skinned people, and of the presentation of fair-skinned women as gifts to dark-skinned fortunetellers, is documented in the ancient Hindu text Rigveda composed in Sanskrit around 1500 BCE. Around 1000 CE, as Islamic armies from Central Asia took over the northern parts of the subcontinent, a preference for lighter skin was also discernable, although historical evidence is unclear how far these political elites subjugated populations solely based on race.” (Sheth et al 2021, pp 496- 497)

While analyzing gendered colorism in Malayalam film industry Geetha argues,

“Moreover, the same discriminatory representations are reflected in other regional industry with colour-coding of roles, wherein, dark-skinned actors are solely cast in roles which has lower caste, class or villainous connotations. (Geetha, 2021 pp 25)”

Vijaya & Bhullar conducted a study to examine the prevalence of colorism in India and investigate whether it can be linked to discrimination in hiring dark-skinned people. Even though the authors did not find consistent evidence for light skin bias in hiring, they do observe from the survey that “white skin is at least the aspirational preference for individuals themselves” (Vijaya & Bhullar, 2022. Pp 622).

One could also observe this deep-rooted colorism in the textbooks. The textbooks depict working-class people with dark skin. Figure 4: (a) shows a mason as dark-skinned, while the observer is light skinned. Similarly Figure 4: (b) shows a milkman, who is also dark-skinned.

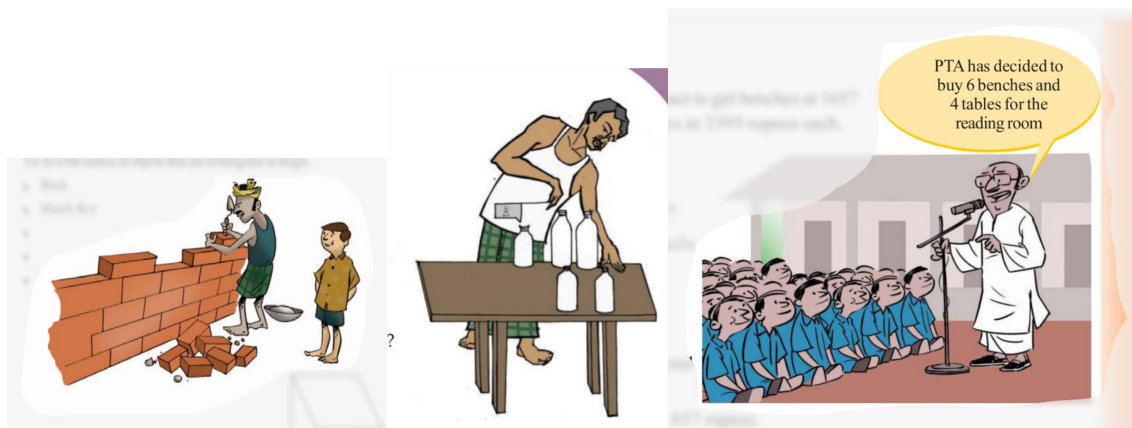


Figure 4: (a) SCERT (2016), p61 (b) SCERT (2015), p29 (c) SCERT(2015a), p14

Moreover, the working-class men are shown as wearing a colored lungi and a vest. In contrast the Figure 4: (c) portrays a man in a relatively more socially respectable position, wearing a white mundu and shirt. By means of these depictions, the textbooks reinforce the stereotypes about working-class people's skin-color and attire. It should be noted that in reality working-class people also could be found wearing shirts and mundu at workplace as can be seen in the following photographs (Figure 5:(a) and (b)) taken at a milk booth in Kerala, while the Figure 5: (c) is a from class 4 textbook.

Reinforcement of religious stereotypes

Textbooks make an effort to be inclusive of people from the three dominant religious background. Textbooks use names that can be easily associated with specific religions to be inclusive of Hindus, Muslims and Christians. In addition, Muslim women are stereotyped as wearing hijab and Christian women as wearing a mundu



Figure 5: (a), (b) People give milk in the booth (c) SCERT (2016a), p-60

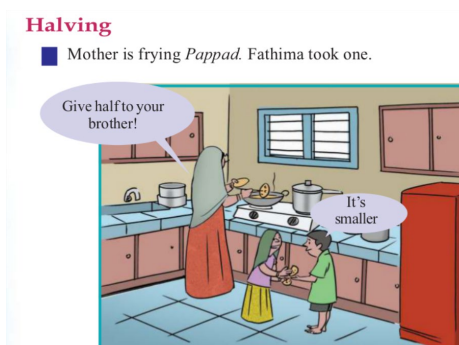


Figure 6: SCERT (2015a), p-39

and blouse. In Figure 6, Fathima's mother is seen as wearing a hijab in her own kitchen!

Absence of caste names

It is interesting to note that even though caste names such as Namboodiri, Nair, Menon, Pillai are commonly used in the state and children enrolled in school are likely to have their caste names mentioned as part of their names, textbooks do not use any caste name. Caste is so pervasive in India that the practice of caste endogamous marriages extends to even Christianity and Islam. There are even separate churches for dominant caste and marginalized caste Christians in some parts (for more details see Deshpande, 2017). The absence of caste names in the textbooks clearly indicate a policy decision to do so.

Discussion

The textbooks we analyzed are the ones currently in use and follow the recommendation of Kerala Curriculum Framework 2007 evolved along the lines of NCF2005. The textbooks make an attempt to be inclusive of the categories that are usually absent or have token representation. The reader can clearly see girls and women, Christians and Muslims, and also a diverse range of contexts. However, in its very attempt to be inclusive, the textbooks exclude certain categories and stereotype others. In their attempt to be inclusive of females, the textbooks reinforce the dominant but erroneous notion that gender is a binary, while the state itself is making special efforts to make education accessible to the transgender learners. Also, to be explicitly inclusive of the two genders the textbooks stereotype them and, in the process, imply that every young person should carry markers that help one neatly categorize the person as a boy or girl. Those who do not fit this stereotype are therefore othered. Similarly, by attempting to be explicitly inclusive of dominant religions the textbooks stereotype the Christians and Muslims as carrying religious markers. This is not only factually incorrect because a typical Christian or a Muslim may not carry religious markers but also the textbooks seem to imply that anyone with a Christian or Muslim name is necessarily a believer. Finally, by using skin color and clothing to differentiate between the working-class and upper-class people, the textbooks reinforce the discriminatory notion that fair skinned people are superior. Moreover, at a time when youth from the marginalized caste and class are challenging the unstated dress code imposed on them by choosing to wear shorts and trousers to work, the textbooks by depicting the working class in lungi and vests undermine their struggle for dignity. Despite its attempt to be inclusive, the textbooks make no reference to the disabled learners while the state mandates that disabled learners should be integrated in regular school. Seen through the lens of queer theory, the glaring limitations of the attempts to be inclusive and the eventual stereotyping becomes inevitable. The politics of inclusion assumes that it is possible to fragment the population into finite number of mutually exclusive totally exhaustive subsets of identical beings. However queer theory points to the impossibility of such fragmentation. Textbooks, by fragmenting the population as male and female, or as Hindus, Muslims and Christians or as members of certain economic class are constrained to create typical members by appealing to prevailing stereotypes and in the process exclude all those who do not confirm to the stereotypes.

Conclusion

In this study we have analyzed 3rd and 4th standard textbooks and our study reveals that in their attempt to be inclusive the textbooks use stereotypical representation of different social categories such as gender, class, religion and so on. As a result, the textbooks end up reinforcing the stereotypes and exclude all those who do not confirm to the stereotypes. Gender stereotypes lead to the exclusion of transgender people from the textbooks even though Kerala is the first Indian state that passed transgender policy (PTI,2015). The textbooks also run the risk of promoting discriminatory notions such as working-class people are dark skinned and Muslim women wear the hijab. While the inclusion of an image of Theyyam - which is an art form of marginalized people in northern Kerala - in the textbooks is a progressive move, the textbooks cannot hope to be inclusive of different social categories, by adding a few in an uncritical way. Such an attempt results in reinforcing stereotypes. There is a need to critically engage with the question of inclusion to design mathematics textbooks that provide meaningful contexts

that appeal to diverse groups of learners. One way to achieve this could be to adopt the same approach the textbooks adopt towards caste, namely dropping the caste names completely. In other words, textbooks could use names that are gender neutral and are not specific to any religious group. Pictures could depict young people in gender neutral clothes. These are just a few suggestions. Without concerted efforts to evolve imaginative solutions to the question of meaningful context for teaching mathematics, the textbooks will reinforce some dominant stereotypes or the other.

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