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TEACHER BELIEFS AND THE TAMIL NADU EDUCATIONAL REFORM 2017

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Triggered by a tragic suicide of a medical aspirant and the poor performance of the students from state schools in the NEET competitive exam, Tamil Nadu revised its curriculum, syllabus and textbooks in 2017. The paper is reflection of the author on the 'teacher beliefs' on the goals and aims of reform, their role in the reform and classroom, nature of science, and the inequities and its impact on the reform process. The recount, evidently, tainted by subjectivity, still can contribute to understanding the ways in which 'teacher beliefs' influence the selection of content and organisation of the teaching learning in state run schools.

INTRODUCTION

The author was the chairperson for the textbook committee on science for classes VI to X for revising the curriculum, syllabus and textbooks for the schools affiliated to Tamil Nadu State Board of School Examination (TNSBSE) recently. The range of response the reform initiative received was instructive of multiple voices that make up the educational edifice. The revision was undertaken with much enthusiasm and expectation. Educational reform ultimately has to have an impact on the actual classroom practice. How far will the new features of the textbook find a reflection in the way classroom interaction is conducted? This crucial question is closely linked with the 'teacher beliefs' on goals and aims of school education, the meaning of 'teaching', 'science', 'nature of science' and the role of textbooks. These beliefs influenced the contours of the shaping of the revised curriculum, syllabus and textbook.

This paper is a summary of some of my reflection on 'teacher beliefs' as an insider-participant in the process of this educational reform. As the recount and reflection is based on subjective, but reflexive interactions, which often went unrecorded, this paper may lack the usual 'distance' and 'objectivity' that one would expect from a scientific study, nevertheless, as a reflexive experience, these may provide some insights into the actual dynamics of the educational reform, various actors involved in the process, and varied concerns that shape the reform.

THE CONTEXT

Tamil Nadu (TN) government had earlier abolished all entrance exams and granted admission to coveted medical and engineering courses based on the marks obtained in the higher secondary examination. Dismissing these claims, the Supreme Court bench verdict delivered on April 11, 2016, made all admissions to medical

colleges subject to obtaining a rank in the National Eligibility cum Entrance Test (NEET) (see Shanbhag (2016) for an overview of issues with NEET examinations).

The tragic suicide of Anitha, 18, an aspiring medical student, who had excelled in her school exam but had done poorly in the NEET and could not get a medical seat resulted in a public outcry. Furthermore, in the NEET examination conducted in 2017, 30% of candidates appeared from schools affiliated to Central Board of Secondary Education (CBSE) qualified while only 5.3 % of candidates from TNBSE-affiliated schools qualified. In a bid to react to the emerging situation, the government of Tamilnadu embarked on a mission to revise the school education curriculum for standards 1 to 12 by 2020 (TN Gov 2017a) and tasked it to the Tamil Nadu State Council of Educational Research and Training (TNSCERT).

Reform process

TN educational bureaucracy combined both movement-building tactics and the conventional tools of executive power initiating the reform. Even while the government had constituted a Curriculum Development Committee (TN Gov 2017b) and reconstituted (TN Gov 2017c) the High-Level Committee for revamping School Education, earnest effort was made to recruit administrators, educationists, policymakers, teachers, NGOs, public intellectuals, writers, poets, environmentalists and scientists from Tamil Nadu and educational experts from all over the country including representatives from union government agencies "to collect views from cross sections of the society on the changing dynamics of the school curriculum." (Government of Tamil Nadu 2017d, p.5) (See his document for a detailed description of the various efforts made to reach out to various stakeholders).

Development of revised textbooks

Deviating from the earlier practice of resorting to few hand-picked teachers/writers, the reform process of 2017 involved a considerable number of teachers and experts, drawn widely from diverse educational boards, in the authoring of the chapter contents, writing, design and development. Extensive interaction marked the development of the chapters, and often, the texts were sent for external review. Along with various boards in India, the science curriculum in Indonesia, Cuba, Malaysia were examined. The textbook writers were also encouraged to consult CBSE, Kerala, Karnataka, and Andra Pradesh textbooks. Further, the textbooks content, treatment and presentation of Singapore, New Zealand, South Africa, Nuffield Foundation and the textbooks prepared by the Eklavya, Bhopal were consulted in designing the content, treatment and presentation of the chapters of the textbook.

Features of the revised textbooks

Instead of viewing textbooks as the ultimate repository of knowledge, the policy strive was to make it a "window to the world of wisdom" (Udhayachandran 2019, p6). On the one hand features such as case studies, infographics, concept maps, reference books and on the other ICT like QR codes were used to take the textbooks beyond the conventional garb, while on the other hand teaching-learning was to be radically changed by "shifting the focus of the science classroom from content knowledge towards critical scientific inquiry" (TNSCERT 2017a, p. 4).

Instead of "merely privilege[ing] factual knowledge", simple episodes from the history of science (discovery of air as a mixtures of gases; history of the models of atoms) were used to provide an "understanding of how we arrive at such knowledge, critical inquiry into potential explanations of phenomena and dialogues in science" (TNSCERT 2017a, p.4). Simple expository models in science, such as particulate nature of matter, ray diagram of light were presented to make students' appreciate how science has been able to go beyond the appearance and give us an interlinked and universal perspective on complex and diverse phenomena of the natural world . A novel feature, info-box providing inspiring information in the form of 'do you know?', were incorporated to 'nurture the natural curiosity' (TNSCERT 2017b,p.3).

Further, to give a cohesive picture of science presented in the upper primary level, the concepts, topics were sought to be organised into five major overarching themes: diversity, interactions, cycles, systems, and models. The theme 'diversity' was linked to the idea of 'classification' and diversity in life, ecosystem, diversity in the chemical elements, physical properties of matter, chemical composition were highlighted. The idea that 'change' occurs due to some form of interaction was presented by linking, the interaction of bodies under collision, interaction of magnetic materials, interaction such as between the environment and public health, interaction of acid and bases, the interaction between habitat and the organism and predators. The digestive system, the circulation of blood, the reproductive system in flowers, electrical systems (circuits) are 'systems', while the oxygen-carbon dioxide cycle between plants and animals, biodegradation, and the water cycle exemplify cycles.

To give one example of the themes, models are one of the vital aspects of modern science, yet models are not a direct reflection of 'reality', but idealised mental constructs that help in predicting behaviour to an extent. With the model of a ray diagram and using the concomitant geometrical optics, it is possible to predict the behaviour of the images formed under simple lenses. Likewise, the model of the particulate nature of matter enables us to predict outcomes such as the effect of heat on solids and fluids.

The principles of curriculum revision and/or reorganisation ultimately have to be absorbed by teachers who transact the new textbooks. How did teachers view the whole exercise?

BUREAUCRATIC PRACTICES AND TEACHER BELIEFS

Some quotidian practices followed by the educational bureaucracy significantly modulated the teacher beliefs about the goals, aims and purpose of the reform.

The spectre of NEET examination

The spectre of the NEET examination significantly influenced the reform process all through its course. As Udhayachandran (2019), notes in a recent article "textbook revision assumed the proportion of a major reform in Tamil Nadu mainly due to the National level Entrance Test (NEET) trigger" (p. 6_). He also cautions "while it would be improper to design a curriculum only to satisfy the dynamic and commercial needs of any test, one cannot afford to ignore the concerns arising out of such demands" (p. 6_). Although the upper primary textbooks have no direct link to NEET, the 'teacher belief', emanating from the broader social

perception about the NEET legacy of the 'reform' influenced the teacher's views. Hence 'exam oriented' presentation formats such as 'bullet points for ease of memorisation and recall' were often insisted upon.

Content audit of the revised textbooks

One would have expected the syllabus, and the content and treatment of the chapters of the textbookto evolve from the concerns and desires expressed in the 'Tamil Nadu Curricular Framework 2017: A statement on Science Curriculum' (TNSCERT 2017a), and the 'Position paper on science: a detailed study' (TNSCERT 2017b). However, in practical terms, the driver was the outcome of the 'gap analysis' between the old TN textbooks and that of CBSE and neighbouring states like Kerala, Andhra and Karnataka undertaken by the TNSCERT. The 'gap analysis' revealed very little difference in the syllabus and content, but highlighted that the TNSBSE textbooks had only 'knowledge-based questions', while the CBSE textbooks had considerable NEET type 'application-based questions'. The revision of textbook units became an exercise to ensure adequate 'application-based questions' and that there are no 'gaps' between the revised textbook and the CBSE textbooks. When the first set of the textbooks came out the touchstone of the evaluation was the NEET examination. T. Udhayachandran said "comparison between the content of the new textbooks and the recent NEET question papers and found that almost 50% of the questions were from the Plus One portion. We checked whether those questions are reflecting what we have incorporated in the new textbooks and found that it was 100% in physics and 99% in botany and zoology" (Sujatha 2018,). Rita John, a domain expert involved in the textbook development noted that "while the old syllabus covered only 35% of the questions of the NEET syllabus and lacked application-oriented questions ... all most all the questions of the NEET 2019 were covered by the revised higher secondary textbooks" (Raghu Raman, 2019,). These quotidian practices further reinforced the 'teacher belief' about the 'goals' of the reform was to 'train' students for NEET.

TEACHER BELIEFS ABOUT CLASSROOM INTERACTIONS

'Moral obligation' and 'duty' of a teacher

Although the policy percepts described teachers as a 'stakeholder' and an 'agency' (sic), that was not the self-perception. Except for a vocal few, most teacher-experts were passive and remained mute to the discussions about the goals and aims of reform. On the other hand, textbooks, seen as the sole organiser of the classroom interactions, saw vociferous engagement from otherwise docile teachers. Does this hesitation for engaging with policy and curriculum imply dissent or resistance?

The passiveness, it could be discerned, did not arise from fear of the authorities, but rather how they viewed their own place at the table. The mental model, one could discern, was that an educational edifice is a giant machine, and they, teachers, are mere 'cogs' with a specific domain of operation. Most teacher-experts viewed the shaping of the vision, policy, and curricular framework as the 'duty' of the education bureaucracy; their own role is limited to content and treatment of textbooks and classroom practices. This perceived division of labour, subtly implied that the vision, policy and curriculum are pious statements having only ceremonial value with no real import. It is the textbooks that determine the classroom practices.

The teachers used two distinct words – 'duty' and 'moral obligation' to describe their role. Adhering to the 'instructions' such as that the classroom interactions must be 'constructive', is a 'duty', irrespective of their views on the same. However, the 'moral obligation' of a teacher is 'educating the student', often understood as training the student to commit to memory parts of the textbooks, and preparing him/her for 'examinations'. In this frame, the demands of the new policy, such as 'activities', 'projects', 'collaborative learning' were not seen as 'new ways of teaching/learning', but as a set of 'instructions' from Education Department, that they are duty bound to follow. Although most of them agreed that children should be motivated to do classroom projects, they saw it as a stratagem to entice students to the memorisation regimen rather than a radically new way of teaching-learning.

Disquiet about Inquiry pedagogy

The vision statement TNSCERT (2017a) expects every school to be a place where "children learn to ... engage in data collection, tabulation and discuss their interpretation.. [and]...design and perform simple experiments of their own, and argue the outcomes" (p. 8). The notion that students collect data, tabulate them, 'discuss their interpretation' and 'argue the outcomes' of experiments goes much beyond 'tabletop', or 'hands-on' experimental demonstrations by the teachers.

The demand for demonstration of experiments, at times, may be resented on the grounds of lack of time and 'workload'. Nevertheless, the teachers are comfortable with them. The demonstration, even data collection and tabulation are 'governable', as the results are pretty much anticipated, pose little challenge. However, the contours of 'dialogue and discussions' are uncertain. The prospect of 'un-governability' of the discussions, as well as the potential humiliation it can cause, mortifies, even terrifies the teachers.

Although corporal punishment is sometimes used to 'discipline', it is 'control' that concerns teachers. Often' control' of the classroom is insured through the respect, esteem and reverence teachers command. Without 'control', the teachers feel that they will not be able to fulfil their 'duty' and 'moral obligations'. The perceived and implicit hierarchy of knowledge provides the 'reverence and esteem', while the power to admonish and punish gives them the authority. Anything that threatens or destabilises these twin 'powers' in the classroom is seen as a threat.

Furthermore, the all-pervasive 'textbook culture' also undermines and seeds doubts on the efficacy of 'dialogue and discussion' for instruction. Kumar (2005) says that the textbook culture treated the "prescribed textbook as the de facto curriculum, rather than as an aid, the teacher taught the text by elucidating it, by asking children to copy and memorise it, and finally by drilling them to answer and memorise questions that were based on it" (p. 67). Thus the textbook dominates the classroom, and neither teacher nor students wish to digress from it. If something is not elaborated in the textbook, then such activity finds no place in the classroom. Conversely, if some text is written, the 'text' itself becomes an object to be 'taught' defeating the purpose of the inquiry.

Mental image of science and nature of science

The curricular framework for science (TNSCERT 2017a) says, "At the upper primary stage, the emphasis has

to be on what constitutes the process of science, its distinct way of building knowledge" and the classroom process must have "fundamental commitment to experimentation and verification ... gathering data and information systematically ... learning to interpret data ... model building and exploration of how things work" and that the "structure of science is also introduced at this stage" (p.7).

The actualisation of this percept implies a particular understanding of the nature of science. A recount of the discussion on the preparation of a chapter on 'health' would illustrate how the teachers viewed 'science'. The draft text reads "Consider malaria, anaemia and the injury resulting from falling. All these are an illness of one kind or other. Are they all the same? Often common cold may spread from one member of the family to another. However, anaemia does not spread from one patient to another. Those diseases that can spread from one to another are called infectious diseases. Non-Infectious diseases do not spread from person to person. They have other causes. While ... are examples of infectious, and ... are examples of non-infectious diseases." (TNSCERT 2018, p.1).When the teachers edited it, the revised draft was typical of 'kunji' catechism style. It read "The prevention and treatment of sickness can be considered in two groups for their better understanding. They are, communicable and non-communicable disease" . Examples of infectious diseases are ... and non-infectious diseases are ..." (Department of school education 2019, p.87) Why should we 'group' the diseases? How does such a classification help? However, it can be seen that the revised text readily lends itself to set questions like 'diseases are classified into ....', or 'give three examples of non-infectious diseases'.

Why should one accept assertions made in the textbook? A discussion during the preparation of a chapter on tropism may illustrate the ingrained view of the nature of science. The first draft of the chapter read: "Roots during the germination display a tendency to grow downwards, while shoots grow upwards and this is an example of tropism. This tropism is called Gravitropism" (TNSCERT 2017 d, p.5)). The teacher-experts were baffled when questioned; 'is it root or shoot or both that sense' gravity'?', 'How do you know that the factor that is involved is 'gravity' and not any other factors, say light?' 'What happens when you try to grow a plant in say, space under microgravity conditions?'. We decided to include a small section on 'how we know what we assert' to give a historical overview or provide some evidence for some of the claims asserted in the textbook. However, more often such narrations were edited to bullet points giving information that such and such scientist from such and such country did an experiment during the year so and so that 'proved' the claim. It was evident that teachers often viewed the presentation of 'school science' to be 'authorised' piece of information and not necessarily something that demand 'appeal to reason'. Once again 'knowledge' was seen as 'authoritative', in a sense, accumulated, attested and transferred by 'authorities'. In this frame everything said in the textbooks becomes unquestionable 'facts' and 'truths', leaving little scope for individuals or a group of children constructing their knowledge through exploration, experimentation, dialogue and rational discussion.

TEACHER BELIEFS ABOUT SOCIAL JUSTICE CONCERNS

Socio-historical factors such as caste discrimination, the colonial legacy of modern educational institutions have resulted in social stratification in Tamil Nadu, as is the case elsewhere in India. Osborn, Broadfoot,

Planel, and Pollard (1997) observe in addressing the issues of educational opportunity, social disadvantage and inequality, strategies used in France and England are typified by what he calls as 'universalistic norm' and 'differentiated approach'. Universalist norms "provide the same curriculum and pedagogy to all pupils regardless of who they are, where they live or even, within limits, of their ability level" (Osborn et al., 1997, p.377), while the 'differentiated approach' approach demand that the classroom must take into account the needs and the socioeconomic characteristics of the local environment and pupil.

In TN, the public discourse is heavily influenced by the republican values and social justice paradigm, and any talk of 'differentiated approach' is anathema. On the other hand, the social arrangements for differential schooling, reproducing the social iniquities, were accepted. TNSBSE used to have multiple school boards until 2009, until the single 'samacheer kalvi' (uniform education) was adopted in 2010. However, at the national level multiplicity of national boards, such as CBSE and ICSE, persists. Teachers viewed the existence of multiple boards, as reflecting the students' potential rather than an institutional arrangement that reproduces social stratification. When the first set of the revised textbooks came out, a domain expert stated "We have set new standards for the students. The concern was whether rural students would do well" (Sujatha 2018). The revised textbooks were criticised for being 'voluminous' and 'heavy' for TNSBSE affiliated schools. The contradiction of the normative 'universalism' and the practice of 'differential' education was not easy to resolve.

DISCUSSION

Will the revised textbook, syllabus and curriculum make a change in the classroom interactions? The reform policy of 2017 states that "realising these changes requires empowering teachers by providing them with a range of educational resources ... providing teachers' guides for each textbook, building teachers' portals for knowledge sharing, training teachers in technology use, especially ICT enhanced pedagogy" (TNSCERT 2017a p.9). Thus the policy looks at the teachers as 'implementer' and 'teacher preparation' as providing necessary teaching resources.

As Fullan (2001) observes "implementation is the essence of change, it follows that the teacher as implementer is central" (p. 8).However, with teachers predominantly viewing 'knowledge' as merely 'authorised' piece of information, as Clarke (2003) notes "knowledge continues to be 'given' ... learning continues to be based on repetition" (p. 37-38). The cultural constructed-ness of teacher thinking and teaching results into "embeddedness of practice and its resistance to change" (Clarke, 2003, p. 29). For productive school reform, 'reculturing teachers' to the central tenets of the reform is imperative (Fullan, 2001, p. 8). Without mindset change, despite the improvements and innovations in the revised textbook, classroom practice may not see much-desired change.

Pathmarajah (2014) observes that state bureaucracies, entrenched in a behaviourist mindset, often produce a specific normative discourse about educational procedures, routines, and tasks that construct teachers as technicians of administrative labour, students as passive and neutral, and learning as memorisation and thus frustrate and undermine the constructivists' educational reform. Nevertheless, as Niesz and Krishnamurthy

(2013) observe, activist-administrators, at times, have successfully "used traditional tools of bureaucratic power, including top-down mandates, to institutionalise the reform" (p.29_), the 'movement-building tactics' generated the 'egalitarian spirit', 'moral authority and goodwill' ensuring the mindset change among teachers leading to change in classroom practice.

Although criticised for being top-down, bureaucratically imposed, limiting teacher's autonomy, and feared to have brought uniformity and rigidity in the classroom, the Activity Based Learning (ABL) initiative was able to transform the mindset of the teachers, by consciously forging a network of "social agents from across multiple fields of practice, including participants of literacy and science people's movements, educators from progressive NGOs and elite schools, and state administrators" (Niesz et al., 2014, p.163).

During the ABL initiative, "people's movements and progressive education initiatives ... [formed] an influential network" and engendered a "counter-hegemonic education knowledge, that ultimately transformed classrooms in over 37,000 schools" and "positioned the government schools to lead (rather than follow) social change" (Niesz & Krishnamurthy, 2014, p.163). Niesz and Krishnamurthy (2014) point out that the "convictions that, on the one hand, every child can learn and, on the other, children are equal irrespective of their success on school tasks were clearly at odds with what we heard about conventional views of learners in the government schools" (p.158). The 'failure' of the child was not dismissed as a reflection of the limitations of the 'innate' capacity of the child, but called for suitable approach particular to the child. Although student performance in literacy and numeracy did not show significant increase, children in ABL schools were less reliant on their teachers, more likely to seek help from peers, had more faith in their abilities to solve difficult questions themselves, were more confident, and had more positive inclination in their abilities to cope with exams and schoolwork. (Akila 2011; SchoolScape 2009; Singal et al. 2017).

The 2017 reform initiative too began with activist-administrator(s) roping in various social segments. The policy note, curriculum framework and syllabus were shaped with the involvement of massive participation. However, within a few months of the launch, the state government shifted a key official leading to the waning of the 'activism', and the reform became yet another bureaucratic top-down dictate. Once again, the teachers were seen as 'implementers' and relegated to the periphery of the reform. The reform lost touch with the broader network, and the agenda of reculturing teachers lost its steam. Hence one fears, despite the revised textbooks, syllabus and curriculum, the actual classroom practice may not see much significant change.

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