Politically Mathematics

22-23 December 2016

Venue: French Institute of Pondicherry
Organized by: The Social Science Collective

SCHEDULE

Thursday 22nd December			
		Posing Questions	Discussion
10:30 am	Introductions - Kishor Govinda		
12:30 pm	Mathematics and State-building	Senthil Babu	Kavita Philip
01:30 pm	Lunch Break		
02:15 pm	Mathematics and Industry	Kishor Govinda	Dinesh
03:15 pm	Tea Break		
03:30 pm	Mathematics and Labour in The Knowledge Economy	Kavita Philip	Kishor Govinda
05:00 pm	End		
Friday 23rd December			
09:30 am	Mathematics Education and Society	Shreya Khemani	Jayashree Subramaniam
11:00 am	Tea Break		
11:15 am	Mathematics and the University	Tathagatha Sengupta	R Ramanujam
12:45 pm	Lunch		
01:45 pm	Mathematics and the Public	Kishor Govinda	Anil Menon
03:15 pm	Tea		
03:30 pm	Discussion on Manifesto	Moderated by Babu and Kishor	
05:00 pm	End		

Note for Discussion for the First Workshop
December 2016, Pondicherry.

What could Political Economy of Mathematics Be?

Over the last many decades, concerns about the relationship between science and society have informed public discourse at multiple levels – both internationally and within the Indian context. Although voices have been raised by different sections from within and outside the academy, and with varied political motivation, the efforts made to understand and transform this relationship have contributed both to theory and practice – influencing the different points at which science and society interact. In India, the Peoples Science Movements (PSMs) – which themselves have been guided by varied motivation – have sought to promote scientific temper, popularize science, to aid State building and national progress by promoting science and science education among the masses, to critique the relationship between Science and Technology and industry and also to use science as a means for social transformation. More recently, studies in the Sociology of Science have also sought to understand the relationship between science and society, to critique the practice of science and the structure of scientific research, and to question the role of scientific activities in accelerating inequality.

Much more needs to be said and understood about the work done perhaps, but in essence, there have been sufficient efforts to reveal that the relationship between science and society is far from benign. In some ways, this relationship manifests itself in very apparent ways – the relationship between progress in science and technology and economic progress for example – and thus makes way for it to be better understood, and also challenged more often. In contrast however, the relationship between mathematics and society, across the various levels of education and access to technology, is much less understood. However, it is precisely because of this that it enjoys a special status – one that perhaps needs to be probed further.

Mathematics is often seen as a tool to be able to learn and do science. It is what formats and determines vocabulary, and that is where it's role ends. On the one hand, this attitude lends a sort of impunity to the mathematics community within the academy (Pure mathematicians are not bothered by what their science is used for, the applications it finds is not their concern – they study mathematics for its own sake.) On the other hand mathematics assumes a crucial and dominant role within educational curricula precisely because it is what is needed in order to engage with scientific, technological and economic processes and activities. It is guaranteed a place at the university and compulsory at school. It therefore also serves as a sort of gatekeeper, helping to shape a notion of merit. It determines, in many ways, who takes part in the development of the Nation and industry and to what extent.

To address this issue we should look at the nexus of the producers of mathematical knowledge and mathematically skilled professionals. In light of the recent debates regarding the restructuring of the University Grants Commission, the relationship of centres of research and industry, debates regarding the updating of the tertiary-level mathematics syllabus, and the composition of mathematics education up until that point.

Mathematics is also different from science as a knowledge form in that it is associated not only with skills of reasoning or logical thinking, but also with a deep capacity for abstraction. In a caste-ridden society like India, where the mind is valued over the hand, asking questions of mathematics as to how it renders itself into caste inequalities and reproduces social inequality becomes all the more necessary.

Guided by the larger concerns of how knowledge gets valued in todays changed economy, what processes contribute to creating this value, how forms of knowledge and their arenas of practice serve to uplift an economic system, accelerate economic inequality or support industry and contribute to state building, we feel the need to focus on mathematics as an area of knowledge in particular. And even more specifically, to examine the relationship between mathematics and society in the Indian context.

We feel it is important to understand how mathematics serves and has served as a basis for contributing to industry and State building and in turn how the State, industry, and other forms of organisation make demands – overt and subvert – of mathematics.

This is not the first time such questions are being asked of course. Unlike in the case of science, such concerns rarely emanate from the mathematical community within the academy, and in public. They do, however, find a voice within the community of mathematics education. But as it is, such concerns have been little explored in the context of India. Across the international community of mathematics education as well, discourse surrounding such concerns is increasingly directed towards the politics of curriculum making which asks important questions but has little to do with practice. So what we are left with then is very little in way of data and empirical studies, which will help us be more concrete and pointed even in the questions we are trying to raise.

Formulating these questions to us is only an attempt at perhaps initiating such studies in the context of India. It is an invitation to those who might share these concerns to begin a dialogue.

We are putting up this initial note in the hope that those who are interested could add their own questions, ideas and of course anything that they think is pertinent to this initiative.

The questions and suggestions for study, we thought would help us situate and guide us to work through the concerns. We are looking for people to work together on questions which are of particular interest to them concerning mathematics in India. WE do believe that not merely concerns but even working together is still very much possible in our increasingly fragmented professional and social worlds.

Guiding Questions	Questions as points of entry for study	Sources for study
Mathematics and Industry		
How does labour get commoditised through skilling by mathematics? How does the industry manage mathematically skilled labour? What is the mathematics that contributes – or is perceived as contributing to – industrial growth?	What are the employment trends in industry of the mathematically skilled labour force? How much of the mathematically skilled labour force gets absorbed into management institutes? What is the kind of private capital being invested in mathematical research and mathematics education initiatives?	Looking at mathematics graduates in industry – number, qualification, skills needed etc Looking at microsoft labs, infosys investments etc – when did they begin, in what economic climate etc?

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Mathematics and State building		
What role does the state play in terms of policy, economic interventions, education, and research in promoting or supressing mathematical learning/research? What kind of mathematical knowledge contributes to State building? (Triangulation and private property, the mathematics involved in determining monetary policy, poverty lines, policies of taxation etc) What institutional structures form around mathematics that is commoditised?	What are the employment trends within State structures of the mathematically skilled labour force? What are the kind of mathematics educational initiatives supported by the State in recent years at all levels – from school to research mathematics (ATMs etc)? What kind of funding does mathematical research enjoy and from whom?	Educational initiatives Policy docs NGOs and CSR initiatives supported by the state changing social composition of curriculum designers Trace birth of IISERs?
Mathematics and the Knowledge Economy		
How does mathematics get commoditised in the current economy? How are different forms of mathematical knowledge valued? How does abstraction get privileged? How much and what mathematics must one know in order to contribute productively to the capitalist economy but at the same time not challenge it?	What are the markers of mathematical skill/skills that require mathematics? (from the perspective of capital) How do these markers get restructured in light of social privilege or lack thereof? (eg: region, caste, gender) How much in the mathematics curriculum (school, high school, undergrad) is actually useful? How much of mathematics education serves to make processes of society and economy legible (and how?) and how much serves to anaesthetize?	Look at the mathematics being used by mathematics graduates employed in finance/investment firms etc and compare it with the mathematical training they received at school/college/ university

Guiding Questions	Questions as points of entry for study	Sources for study
Mathematics and the Public		
How is mathematical knowledge perceived to be valuable by the public at large? How does it contribute to asserting/shaping different forms of cultural identity? How does it link to aspiration? What constitutes the popular imagination of who the mathematician is? Of who the student of mathematics is? What does access to mathematics and mathematical prowess have to do with existing structures of social hierarchies? What social structure results from the commoditisation of mathematics as it has over the past 150 years?	What are the aspirations of students who study/wish to study mathematics? How has this changed historically? What is the caste composition of mathematical research community? What are their attitudes towards caste? What are the experiences of dalit students in such spaces?	Interviews with high school students, undergrads?? Interviews with mathematicians, PhD students etc

Politically Mathematics?

Commoditisation is the ascription of value in a way that relates it to the exchange of goods and services. As pointed out by the great radical socialist traditions in Europe of the nineteenth century, the contemporary political-economic structure of our times is characterized by two systems of functioning: Capitalism and the State.

Capitalism refers to a mode of production where sustenance of the majority of the population is through the selling of labour-time in exchange for money or goods, which is valued at time based rate. To function, it assumes a notion of private property, which as a result of social factors, is given value beyond its use in the form of exchange. Property becomes a commodity like labour, and can be bought and sold in the market place in exchange for other forms of property, which may not have any commensurate value, labour, or money. Part of the effect of this process is the on-going commoditisation of various parts of life, starting at labour relations and continuing to personal relationships (such as the relationship between a teacher and student), social status (such as aristocratic titles), sexuality (in the forms of media) and the body (in the form of biometric data).

A vast amount of literature has been produced by the twentieth century academy on the role of knowledge in the commoditisation of various aspects of life, and the commoditisation of knowledge itself. Science, as an institution, evolved in many ways in response to capitalism and the commoditisation

process. Its focus changed from having an adherence to dogma and esoteric traditions to developing a democratic nature, where all people, given appropriate training, were able to inspect the claims of science. Simultaneously, science started becoming a model of practice and an institution onto itself. Business models, development plans, law and medicine started adopting science as a model for practice. Scientific consensus, techno-science and education are all ways science started becoming a deeper part of our lives. .

It is an essential component of the capitalist economy which tries to value all things in terms of capital. Value of knowledge however has been difficult for the capitalist economy to appropriate, and consequently, while most other institutions were completely revolutionized with the coming of capitalism, the university system remained mostly untouched, and the role of mathematics as the central mainstay of a university also remained untouched.

It is not possible for one part of knowledge to become a commodity, while the others parts have not. Over the course of the nineteenth and twentieth centuries, many aspects of the social sciences were re drawn and commoditised in the form of books, research, and techniques. The economist or sociologist today need not have any relationship to the university or be related to the task of theory-making.

In the natural sciences, commoditisation occurred by the establishment of various intermediary institutions to ensure a relationship between the university and capital. Techno-science, engineering, computer science, development, and intellectual property provided a number of ways that biology, chemistry and physics could become commodities in the market in the forms of patents, products and programs. Corresponding theories about the nature of science in society have arisen in the forms of scientism, reductionism, bio politics, and more recently bio capital. Science theory and the social factors behind it have been dissected from a variety of ways, including ideological approaches (Marxist biology, feminist science, etc.) philosophical (social constructivism, historicist, etc.) and with concrete results (the normative nature of the male body in pharmacological research, the sex-gender relationship, the issue of asymmetry of knowledge in areas of health and energy technology)

Mathematical knowledge falls out of the view of this research. Part of the reason for this is that the mathematics-society relationship is not well understood. While the university system and mathematics' special role in it as a centralizing ad essential discipline has remained a constant theme through the feudal era and into late capitalism, the mathematics-society relationship has clearly evolved. Mathematics, as a model of knowledge (law and statecraft) and as a set of techniques (statistics and modelling), have influenced capitalist societies. Mathematics also seems to have a way of responding to broader changes in society, as the mode of education, the place of foundations, the growth of a network, the role of the computer and printing press, and the influence of its "applications" have transformed the subject such that few mathematicians would understand mathematical work from pre-capitalist cultures (including Europe) without sufficient training or annotation.

Mathematics has also been a foundation discipline in education and seen as a subject as essential as language in the formation of a competent labour force. As a result, the commoditisation of mathematics seems to happen at multiple levels. It can be used to transform a labour force from skilled to unskilled, and also creates a series of institutions around it that are made to validate this transformation (eg: examinations, degrees, work experience, demonstrations, prizes, clubs, publications, etc.) This may be true for knowledge systems in general, but in mathematics, the values associated with it can become quite personal and bodily. A mathematician is seen to be engrossed in mathematics and enjoys its application.

So problems end up at the following questions:

How does mathematics get commoditised in different levels (children as skilled labour, professional education, research)? What institutional structures form around it (tuition/training centers, examination systems, departments, research)? How does commoditized mathematics related to capital? (as a mathematical skilled labourer is evaluated, legibility of mathematics to a capitalist, market-university-research nexus, public certification, scoring index and the need of "objective" measures) How do these structures drive mathematics research? How does research work get bench marked? How have they developed historically over the twentieth and twenty-first century? What are the fault-lines? What changes can we anticipate?

The motivation is to look at mathematics as part of a democratic framework. As mathematics is primarily publicly funded, mathematics as an educational form and as a research agenda requires some accountability to the public. We may take Phillip Kitcher's critique of a naïve version of this. Not every work of every mathematician need be rated in terms of social utility, nor does each dimension of the subjects and problems a mathematician works on be understood in terms of social utility. A theory of its appropriation and the social effects of such appropriation is needed though. While mathematics is not leaving our capitalist society in a hurry, it is important to know what role it plays in society and why it seems so eventually applicable, or rather appropriable.

To engage with this project, we would have to develop a theory of commodity that works to the peculiarity of mathematical knowledge and skills. In our team, looking at a range of perspectives, including education, history, and anthropology, we hope to develop a theory which can be used to map out the ways in which mathematics becomes a commodity, what the social consequences of such processes are, what the effect if on mathematical knowledge (both in education and research) and what trends we can use to anticipate.