

LEARNING MATHEMATICS IN NINETEENTH CENTURY SOUTH INDIA

Senthil Babu. D
Department of Indology, French Institute of Pondicherry
senjay@gmail.com

*This paper would attempt to reconstruct the making of an elementary arithmetic curriculum in nineteenth century South India under British colonialism, from the perspective of indigenous institutions of education. This presentation is an attempt to trace the various phases of transition that the indigenous mode of recollective memory based learning in the *tiṇṇai* schools underwent in the nineteenth century under colonial rule. While tracing the various conditions of such transition, this paper shall argue that the colonial regime perpetuated the mechanical memory mode of learning arithmetic, which it professed to dislodge from the indigenous tradition. Learning mathematics under colonialism was very much integral to the making of a colonial empire.*

*Keywords: *tiṇṇai* schools; recollective memory; mechanical memory; colonial education; learning mathematics; nineteenth century; South India*

LEARNING MATHEMATICS AND COLONIALISM

It is yet to be recognized that the indigenous institutions of schooling, called the *pyal* schools, or the *tiṇṇai* schools in the Tamil region were active and pervasive in the South Indian landscape, as were similar institutions, the *pathshalas*, in other parts of India, right through the nineteenth century. It can be argued that the history of elementary education in the nineteenth century could well be a history of how the colonial techno-economic complex engaged with the *pyal* schools. The elementary arithmetic curriculum of the *pyal* schools was one of the compelling reasons for such a continuous engagement between the state and local society in the Tamil region. One could argue that this engagement marked a painfully gradual transition from learning of math, under the regime of re-collective memory, in the *tiṇṇai* schools to one of rule based, procedural, problem solving regime of arithmetic pedagogy, as the colonial education institutionalized itself over the nineteenth century. Could this then be characterized as the emergence of the regime of 'mechanical memory' in the learning of elementary mathematics?

These institutions were called the '*tiṇṇai*' schools in the Tamil speaking region of south India. They were veranda schools, or known as the *pyal* schools in British colonial records. Dharampal (1983) has shown us that they were not unique to south India. They were widespread, dynamic institutions of elementary learning, which pervaded the entire Indian rural and urban landscape in the pre-colonial era. These were elementary schools of a locality. The fundamental aim was to enable the children to become competent/skilled participants in the transactions of letters and numbers within the local society. They were

integral to the material and social world of the people, producers and labourers in a primarily agrarian and mercantile social order. I have elsewhere discussed in some detail, aspects related to the teaching of mathematics and how re-collective memory remained central to this institution (Babu, 2007). This mode of learning encountered its first critics during the late eighteenth and the early nineteenth centuries through the emerging company state and the missionary efforts in education.

The First Phase of the Encounter 1822 – 1854

From the Company's side, the *tiṇṇai* schools were counted and framed for the first time through an elaborate survey which not only provided the statistical returns on the extent and spread of the *tiṇṇai* schools in the entire Madras Presidency, but also characterized them as institutions of rote memory. AD Campbell's verdict,

“while they learn to read and write mechanically, the intellect is restrained from the exercise of its natural powers, and the heart deprived of those all important moral impressions, which can be fixed indelibly only in youth, merely in consequence of every school book used being in a different dialect of which the learner is profoundly ignorant” (1825, p. 112)

would haunt the *tiṇṇai* mode of learning for the rest of colonial era. Every subsequent report on education cited Campbell to frame the *tiṇṇai* under the mechanical memory mode. The very basis of the *tiṇṇai* pedagogy, its efficient use of language in its different metrics, an essential resource for re-collective memory was identified as its most significant weakness. The second critique from the early encounter came from the missionaries themselves. Education was the primary vehicle of evangelical work for most missionary societies. *Tiṇṇai* schools were clearly their competitors.

It was common among the missionaries to castigate the *tiṇṇai* schools as cultivators of rote memory. In setting up their schools, Tamil was the medium of instruction and Tamil arithmetic was taught. There were about 950 such Tamil schools, compared to 93 English medium schools of this kind. Effectively, the missionaries were teaching Tamil arithmetic, using the *Enṇuvaṭi* in the majority of their institutions (Selections, 1855). The most interesting aspect to the missionary engagement with the *tiṇṇai* was not over contending hegemonies over a local public. They were inadvertently carriers of a system of pedagogy called the Madras System of Education. This system of pedagogy with its origins in Madras went to England, blessed by the Episcopal authority of the English church, became one of the primary means to popularize elementary education in England and came back to India - all along, going through continuous attempts at modification and improvement (Tschurennev, 2008).

Rev. Andrew Bell was the company chaplain in the Egmore Male Asylum in Madras during 1789-96. During his tenure, he encountered, or rather, discovered the *tiṇṇai* pedagogy during one of his morning rides. He reorganized the *tiṇṇai* pedagogy in two crucial aspects: a) the actual working of the *tiṇṇai* pedagogy was reframed into a set of principles based on

Christian value system b) internally, the memory mode of learning in the *tiṅṅai*, using mutual instruction was reconstructed with respect to reading, writing and arithmetic, the three R's, as perceived in England. The localizing of the Bell pedagogy in South India through the missionaries, brought up a scenario where within the same Tamil missionary institution, one had the Bell system in operation, with Tamil schoolmasters; and in other sections, a different Tamil schoolmaster would be teaching Tamil arithmetic of the *Ençuvati* mode, using palm leaves. The missionary strategy evolved out of this experience, which clearly stuck to 'native ciphering' in its Tamil schools till the students were ready for their European arithmetic. In their English medium schools in urban centers for the landed elite, they continued to teach European arithmetic, primarily using European textbooks. Meanwhile, the Fort St. George College establishment, under the auspices of the Company, attempted a collaborative exercise in the teaching of arithmetic, through the publication of the first modern arithmetic textbook in Tamil, authored by Pantalu Ramasamy Naicker, called *Kanitadeepikai*, in 1825, assisted by a French hydraulic engineer, Major DeHavilland. Ramasamy's Arithmetic marked a very clear break in the evolution of the colonial arithmetic curriculum. It enabled a new kind of circulation, the diffusion of textbooks as not merely teaching aids but also showed the administration a effective way to extend their authority, right into the classroom. By the mid nineteenth century, with the combination of missionary engagement and company's intervention, certain features became significant:

1. It had set the elementary arithmetic curriculum to the four simple and compound rules along with the rule of three. Though professedly against memory, in practice, it seemed to have perpetuated it, as in the case of the English experience (Howson, 1982)
2. Arithmetic was about memorizing tables and manipulating numbers to a set of rules, to achieve a host of rules also become set, through the use of different school books from England. The normative values associated with arithmetic became, perseverance and steadiness of mind, which was not yet found in the Indian student. However, it was believed that the anxiety of an English education would ultimately inculcate such values in them, through the learning of modern arithmetic.
3. The use of textbooks became integral and indispensable. Along with them, practicing problem solving in the four operations became stuck to slates, or the pen and paper arithmetic, and a few genuine attempts to introduce mental arithmetic all became mere supplements to the slate.
4. The thousands of *tiṅṅai* schools continued to flourish completely in parallel to all these developments, with its *Ençuvati* mode. The Hindu monasteries from the Tamil hinterland now started printing the Tamil number primers and table books in Tamil, in the new letter press without a single change. Palm leaves became printed books, in the same sphere of circulation - the *tiṅṅai* schools, where one could not cite a single English numeral in any of these printed Tamil texts for the rest of the century.

It appears then that this parallel coexistence of the *tiṇṇai* mode and the textbook centered, slate centered arithmetic was well established by the the 1850s, and nothing much changed in their respective practices for at least, the next three decades. And since then, any encounter between the Indian student with modern mathematics, in its institutional avatar was characterized as one entrenched in mechanical memory.

The Second Phase of the Encounter: 1854-1882

Tiṇṇai schools were surveyed again in the middle of the century, where the spread of the missionary effort on the modern lines, in particular the extensive use of textbooks was noted (Selections, 1855, cccxi-cccxii). This fresh survey gave a fresh impetus to the policy of converting the *tiṇṇai* schools on the one hand and extending the textbook industry on the other, through the expanding and centralized colonial educational bureaucracy. Textbooks became the vital medium of this control and curriculum prescription for eligibility of grant in aid, the guiding frame of authority. Minimal enrollment forced innovations within the grant in aid, on a continuous basis, like the salary grants system, the payment by results system or the combined system of both salary and results, all meant to convert the *tiṇṇai* into the modern fold. The *tiṇṇai* however survived undisturbed, but for a few towns where the inspectors would reach in their extensive tours (provided it was an upper caste neighborhood), where the village elite (often of the same caste as that of the inspector) would determine the possibility of the *tiṇṇai* school to convert. An entire series of public examinations in the colonial state's consistent effort to create a recruit-able public took on from the early 1840s, which was also modeled on the British tests for civil services. These tests had a rigid prescription of the curriculum.

By the 1870s, a well formulated critique of the curriculum, examinations and the rule of textbooks evolved and the most significant evil was found to be mechanical memory. In this phase of conflict and conversion of the *tiṇṇai* schools, luring the *tiṇṇai* schoolmaster with incentives (it never exceeded between Rs. 5 and Rs. 7 per month, at its best) did not succeed for two fundamental reasons:

- a) the *tiṇṇai* was an institution that was integral to the village society, or to an urban neighborhood. Its working was completely dependent on the patronage of the inhabitants, in particular the dominant castes, at whose mercy, the *tiṇṇai* schoolmaster was. He was never an independent player in deciding what is to be taught, because, the community decided it
- b) the pressure on the *tiṇṇai* schoolmaster from the school inspectors, who if at all they managed to reach them (even if they did, it was for just once in a year) to follow the modern arithmetic textbook, the slate arithmetic or the pen and paper operation-centered arithmetic just didn't go down well with the patrons of the *tiṇṇai* school.

The *Ençuvati*, *Ponṇilakkam* and the *Nellilakkam* of the *tiṇṇai* could not be given up. The *tiṇṇai* functionality and its mode of re-collective memory was so integral to the functioning

of the agrarian and mercantile social world even in the 1880s that any children not knowing to participate in the transactions of the society was unthinkable to the patrons of the *tiṇṇai*.

The Evidence collected from the several members involved in the business of education during the Education Commission of 1881, argued for the inclusion of the *tiṇṇai* arithmetic into the official grant in aid regime, if at all, the government was serious about expansion. And suddenly, arguments about relevance of the curriculum to local contexts, the necessity of skills to enable children for better participation in life, that education should also be for purpose of life and not merely for promotion of higher standards or for that of employment all began to be voiced during the committee's proceedings. The *tiṇṇai* master's proficiency in that mode of arithmetic was recounted, celebrated, almost with a sense of nostalgia. Ironically, this nostalgia came not from the educational establishment but from the employers: the railways, the chambers of commerce, the banks, revenue, public works (Evidence, 1882).

Others went to the extent of arguing that the British had to realize that they were dealing with a complex civilization, and without catering to the varied wants of a country, all a cut and dried curriculum would do is develop 'refined ways of torture' in the name of examinations and evaluation; the summary of this argument was that the state had better leave the business of teaching deductive logic and arithmetic to the natives (Evidence, 1882)

Third Phase of the Encounter: 1882 – 1900s

Such a strong argument for the *tiṇṇai* could not be ignored, and since then, the policy of conversion became a policy of assimilation of the *tiṇṇai* schools. This meant that the local community's idea of relevant education had to be contended with, for it was clear that the people wanted arithmetic in the old, memory mode, making the state yield. In effect, this meant making mental arithmetic one another subject along with numeration and the four operations of arithmetic problem solving. Two things happened which changed the character of the *tiṇṇai* schools in this process, at least to those were willing to change, either for the sake of grants in the offer, or some even for the sake of updating themselves in the ever expanding market for education, where the credibility of one's institution was increasingly being determined by how well the students were scoring in the public examinations and therefore, better jobs - not just any job, but government job.

- ♣ they had to use English numerals; they just cannot continue to practice with Tamil numerals
- ♣ the Tamil fractions involving weights and measures of various kinds now had to be related to English weights and measures. They cannot be studied in isolation. They had to be in relation to the English measures, which meant that conversion tables and the rule of three became necessary if students will have to pass exams
- ♣ and finally, this effectively packaged the *tiṇṇai* arithmetic as an addendum to the slate or pen and paper arithmetic, where you start with the rules and procedures of problem solving. Memorization of tables was a matter of choice, if it should precede

or continue along with that of rule based problem solving. Oral or mental arithmetic as it was known would be an exercise in aid of rule based based problem solving. It assumed a new name, called the bazaar mathematics.

- ✧ Exercises in bazaar mathematics were confined to conversions of weights and measures, which meant learning of new tables and memorizing them. But it just cannot be in the mode of *Ençuvatı*. It was not recollective memory as the very mode of learning. Memorization was not trained and honed as interpretation. Memorization became an aid in arithmetic.
- ✧ It was not prudence that was the preferred virtue as in the case of *tiṅṅai* arithmetic, but speed and diligent following of rules, which will get you to the results became the normative value for students to imbibe.
- ✧ *Tiṅṅai* arithmetic was assimilated into the modern!

Rules after rules emanated from the office of the Director of Public Instruction, while the teacher and the student struggled in the classroom with each other under enormous pressure to go ahead with the daily routine, which has now radically changed from the days of the *tiṅṅai*. Now, they had to pass exams, score marks. Opportunities for learning were confined to making choices of the most pragmatic kind: if you knew to do addition well, up to five digits, then don't bother too much about doing the long division. All you need to do, is to pass. So, the habit of practicing mathematics, became solving problem after problem, which constituted hard work. This became an alternate way for the majority to memorize mathematical procedures, in relation to given types and order of numbers.

By the end of 1890s, there were concerted attempts on behalf of the missionaries and the emerging Tamil intelligentsia to thwart this Examination Raj. Cramming became the most significant devil of education. There was no vocal recital any more, but with slate and chalk now helping memory, rule following, law abiding learners of mathematics were created. Memory ruled in the learning of mathematics. For those who came from the *tiṅṅai* tradition, into the modern arena of mathematics, most of them could not cope. But there were exceptional few, who blended the two traditions, who seemed to have managed to figure out the nuances, people like V. Krishnamachariar, Subramaniam Sastri, Arumuga Navalar from Jaffna and the like, who attempted writing textbooks and later became well known pedagogues. Innovations did not mean much - playing around with examples, employing relevant linguistic strategies in textbooks, and attempts to integrate the *Ençuvatı* mode of learning tables in line with the modern demands of problem solving. The *Ponṅilakkam*, *Nellilakkam* and the *Ençuvatı* stood confined to a realm of circulation, to a very private network, which almost went through a resurgence of sorts in the 1920s, thanks to the wave of publishing of Tamil classical literature, often patronized by religious establishments and the emerging voices of Tamil nationalism.

Conclusion

During the course of the nineteenth century, we have seen how every attempt of the colonizer in 'civilizing' the native *tiṇṇai* paradoxically yielded the same effect – perpetuation of mechanical or rote memory – dislodging of which was the *raison d'être* for the civilizing mission in the first place. The ideas of relevance of an arithmetic curriculum to a local public and to that of a colonial empire were continuously in the making. Generations of young learners had to contend with such political exigencies within the classroom and outside. In this process, a system of learning elementary arithmetic evolved where in the abilities of their mind – qualities such as 'perseverance' and a 'steadiness of mind' – apparently required for successful learning of mathematics (Whewell, 1836) were often found wanting in them. Of course such qualities were not 'universal', at least not with respect to the colonial subjects. If so, where would the legitimacy for the colonial civilizing mission come from? Learning mathematics in nineteenth century South India was integral to the making of a colonial empire.

References

- Campbell, A.D. (1836). On Native Education. *Madras Journal of Literature and Science*, April, 110-116.
- Dharamapal. (1983). *The Beautiful Tree: Indigenous Education in Eighteenth Century*. New Delhi: Biblia Impex.
- Evidence Taken Before the Madras Provincial Committee. 1882. Madras: Government Press.
- Howson, G. (1982). *A History of Mathematics Education in England*. 1982. Cambridge: Cambridge University Press.
- Pantulu Ramasamy Naicker. (1825). *Kanitadeepikai*. 1825. Madras: Madras School Book Society.
- Selections from the Records of the Madras Government. Papers relating to Public Instruction. 1855. Madras: Government Press.
- Senthil Babu. D. (2007). Memory and Mathematics in the Tamil Tinnai Schools of South India in the Eighteenth and Nineteenth Centuries. *International Journal for the History of Mathematics Education*, 2 (1), 15-38.
- Tschurenev. J. (2008). Diffusing Useful Knowledge: The Monitorial System of Education in Madras, London and Bengal, 1789–1840. *Pedagogica Historica*, 44 (3), 245-264.
- Whewell, William. (1836). *Thoughts on the Study of Mathematics as part of a Liberal Education*. Cambridge: J & J.J.Deighton.