UNIVERSAL ACTIVE MATH

A Comprehensive Programme for Universalization of Elementary Math at a national scale

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What Do We Mean by Universalization of Math?

Every Child Should develop

- **Proficiency in Math**
- **Liking for Mathematics**

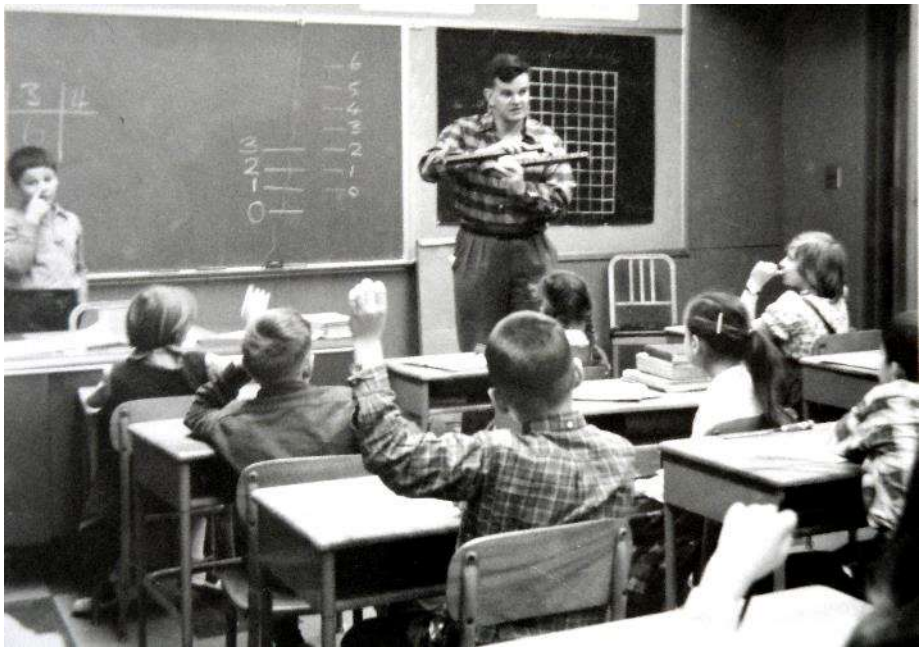
In Quantitative terms : 85 % x 85 %

- should be comfortable with the math concepts,
- should feel confident that she has understood
- should be able to correctly perform the math skills and operations
- should be able to correctly represent and transform simple real life problems into math problems
- should have two-way translation skill, representing real life problems with things and in numbers and narrating a real life situation for a given math expression.
- should develop problem solving, rational thinking and decision making skills

Is Universalization Possible?- W. W. Sawyer

The ability to think mathematically will have to become something taken for granted as much as ability to read a newspaper is at present. Such a change will seem fantastic to many people. But so would universal literacy have seem absurd a few centuries ago.

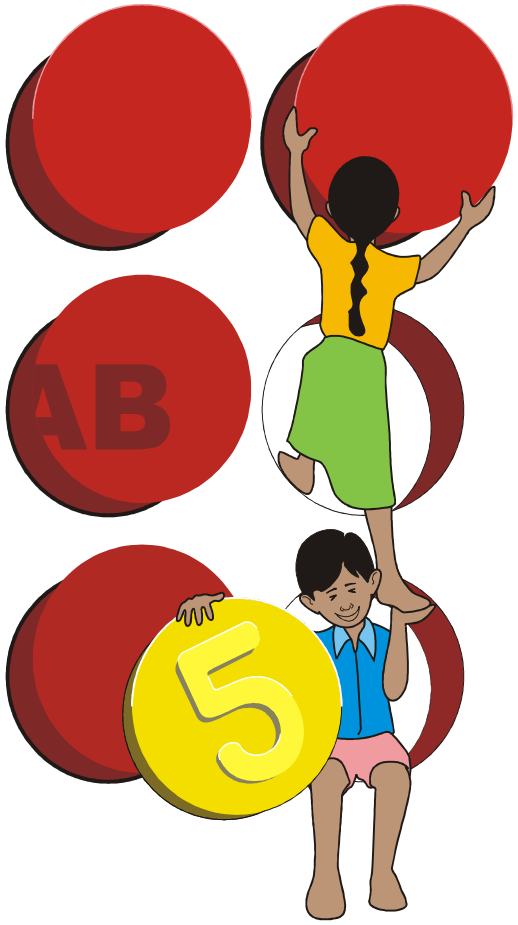
HOW? – W. W. Sawyer

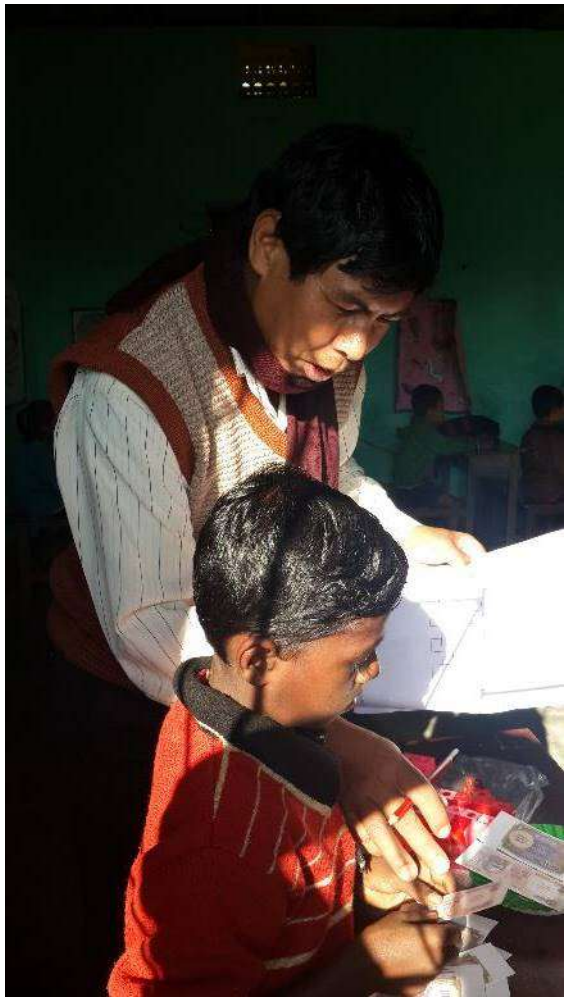


We can go a stage beyond talking about things and drawing pictures of things by arranging for the actual handling of things. There is evidence that this greatly increases the proportion of the population capable of learning mathematics and this evidence is on a mass scale.

Universalization is Possible !
It requires :

- Pedagogy
- Low Cost Learning Materials
- Systematically designed Workbooks
- Systems
  - Training
  - Support
  - Monitoring
  - Assessment
- Accountability at all levels





Key to Every Child Learning Mathematics :
Learning by Understanding
and only by understanding

When children

- do,
- discover,
- understand the concept,
- learn to translate that understanding into the language of numerals and symbols ,
- connect the concept to their everyday life
- apply it in new unknown situations…

they master mathematics.

When all children get such opportunities all of them master mathematics.

Universalization of Quality Education : The constitutional mandate in India

Right To Education Act 2009 :

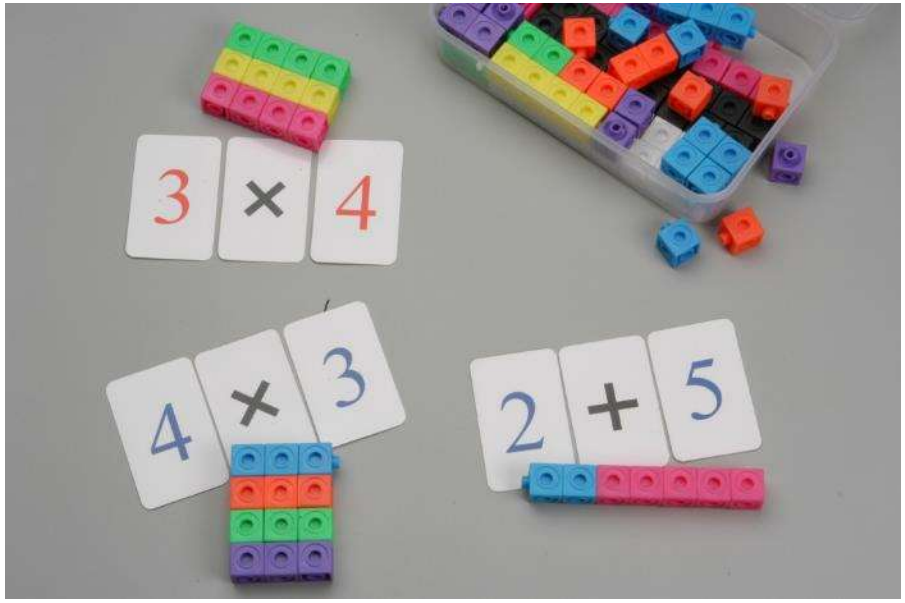
Every child between 6 to 14 has the right to education of a good quality as a fundamental constitutional and legal right.

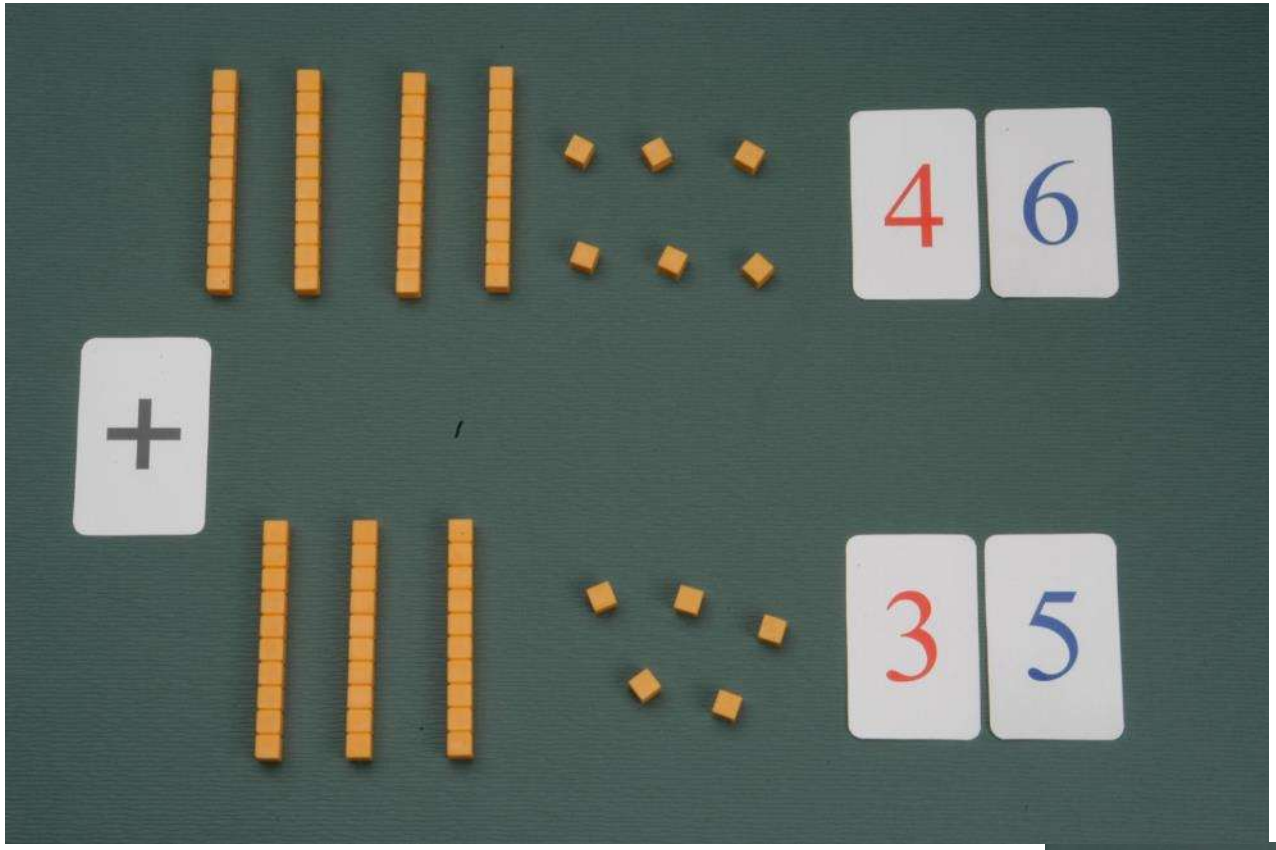
In particular, mathematics education of good quality is now a legal right of every young Indian citizen.

Pedagogy of UAM : Two Step Pedagogy

Step 1 : Understanding a new concept in the familiar language of activity and things

Step 2 : Translating that understanding of ‘math with things’ into the written language of numbers and symbols- the alphanumeric language of math

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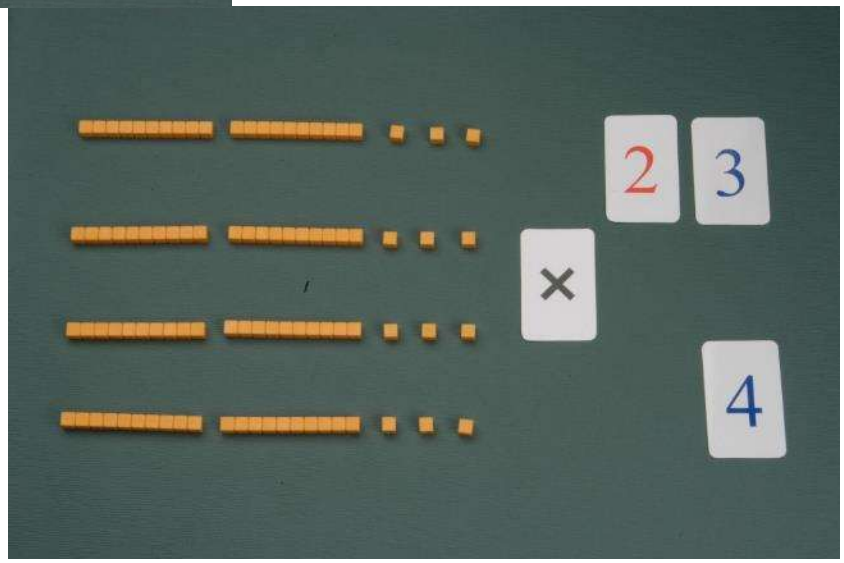
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Learning by doing and understanding- a universal method

- Learning by doing and understanding is not only a methodology for the primary grades
- It is a universal methodology for upper primary math and also for secondary math
- Geometry and algebra can best be learned by this approach

Joining these pieces to get a cube : $(a+b)^3$

Tripura Workshop :
Understanding Volumes

Mizoram Workshop :
Fractions

UAM is Joy of Learning

Children solve the problem in things-language and then translate their understanding into alphanumerics. This method builds their confidence.

UAM is Creativity.

Children discover patterns and everything about shapes, sizes and numbers

Teacher as a facilitator
Group Learning

Good Pedagogy and Materials is not enough to achieve Universalization

Universalization Needs Systems !

Pedagogy Must Be Translated into
tools for mass implementation
which every teacher and officer has
and knows how to use!

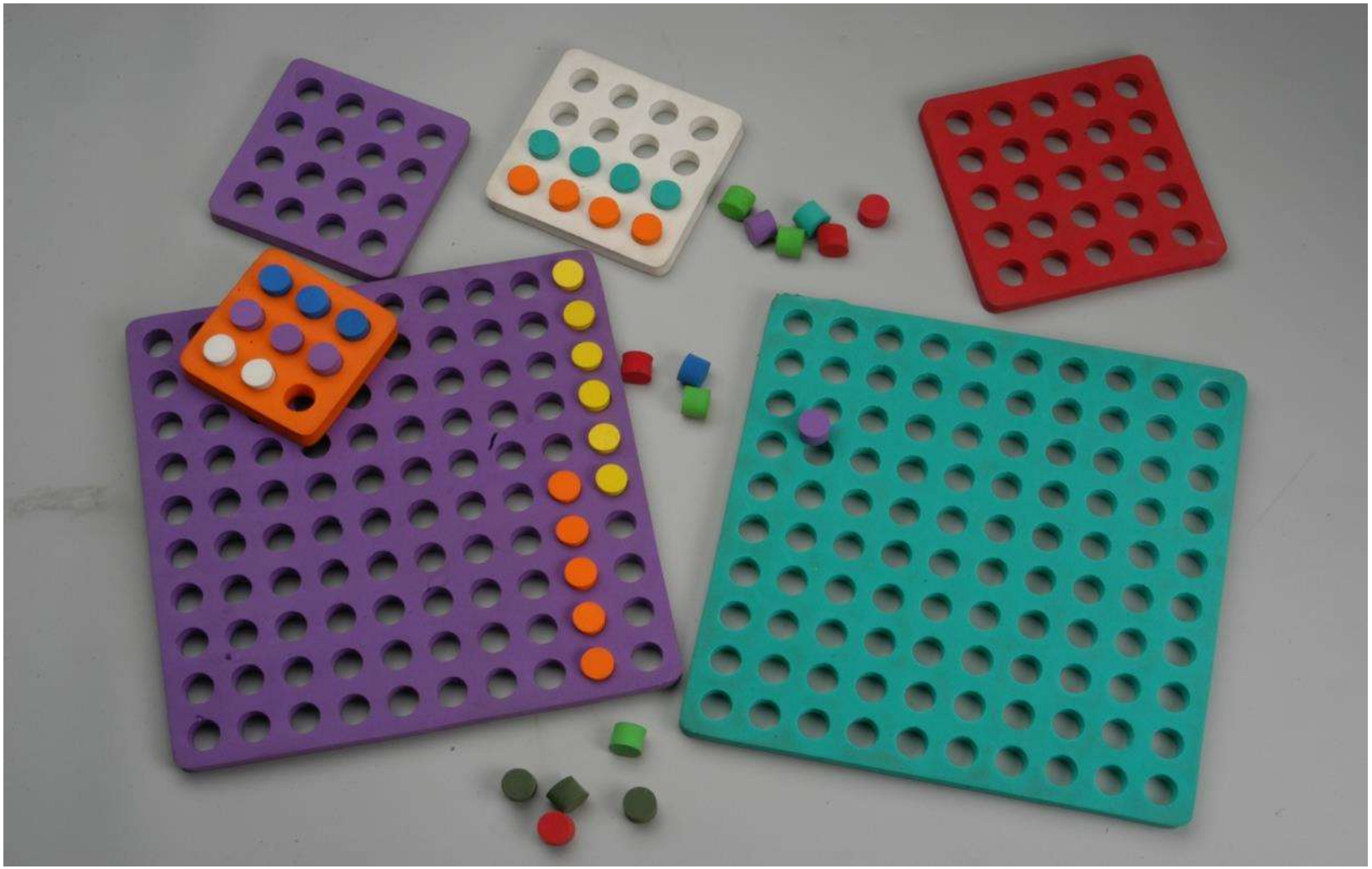
Tools for mass implementation

1) A specially designed Mathkit

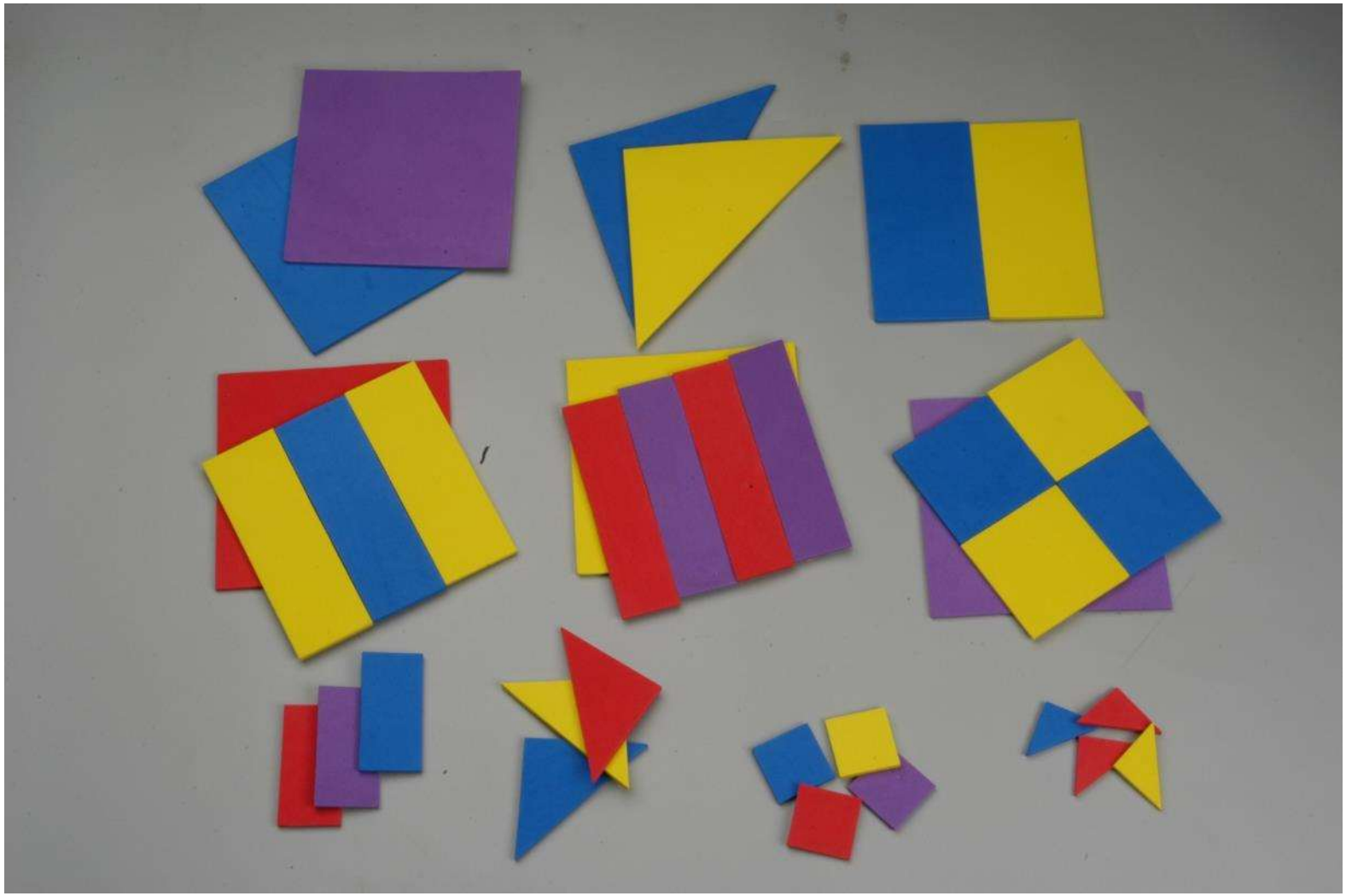
2) Teacher Manuals

3) Workbooks for children having systematic concept construction sequence

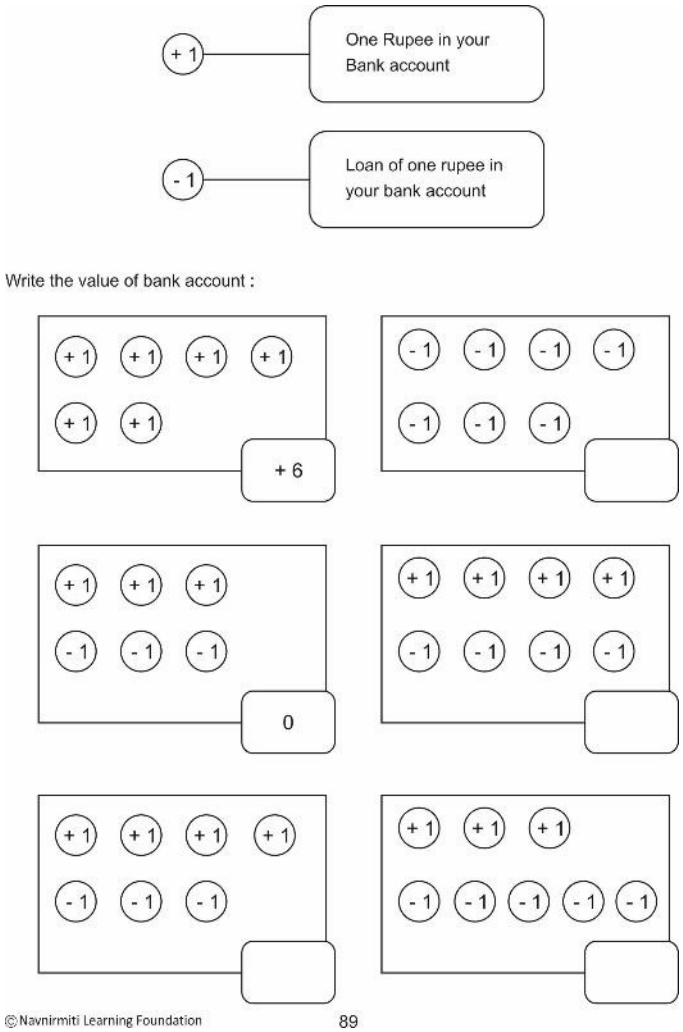
Self Learning Materials : Mathemat

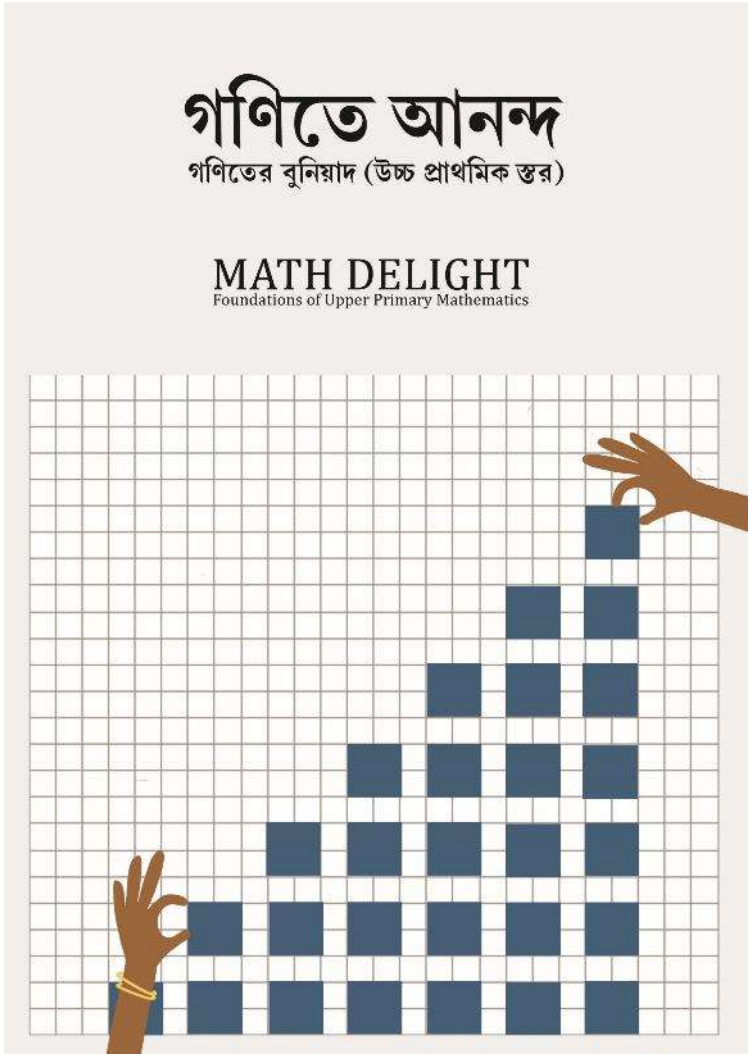


Self Learning Materials : Fraction Kit



Workbooks – Systematic Concept Construction Sequence for all classes





Tools for Mass Implementation : Measurement of Quality Learning

Can we measure quality of education?

IN MATH IT IS POSSIBLE!

It is possible to design tests to measure UNDERSTANDING.

A diagnostic test
which has
practical, mental math and written components

Tools for Mass Implementation : Intensive Workshops for Teachers

International workshop for MSB group of schools

Workshop in Turkey

Tools for Mass Implementation :

- Regular follow up interactions with teachers and On Site Support to them through workshops, School visits, mobile, internet, etc.
- End Year Random Sample Assessment : All Stakeholders Working Together

A tool for Ownership :

Contribution of teachers right from the design stage

Participation in
Material Generation

Conducting the
Workshops

An Example : Three blocks of Goa State

Numbers	**Sattari**	**Cancona**	**Sanguem**	**Total (Rounded off)**
Schools	110	73	125	310
Teachers	185	121	184	500
Students	3459	1974	4000	9500
Clusters	16	9	16	41

Results

Cancona :

First year : overall average achievement level for four classes reaches 75%.

Second year : further improvement by 7% to reach 82%.

Class 1 : 80%,
Class 2 : 85%,
Class 3 : 80%
Class 4 : 81%.

These results are quite close to universalization norms.

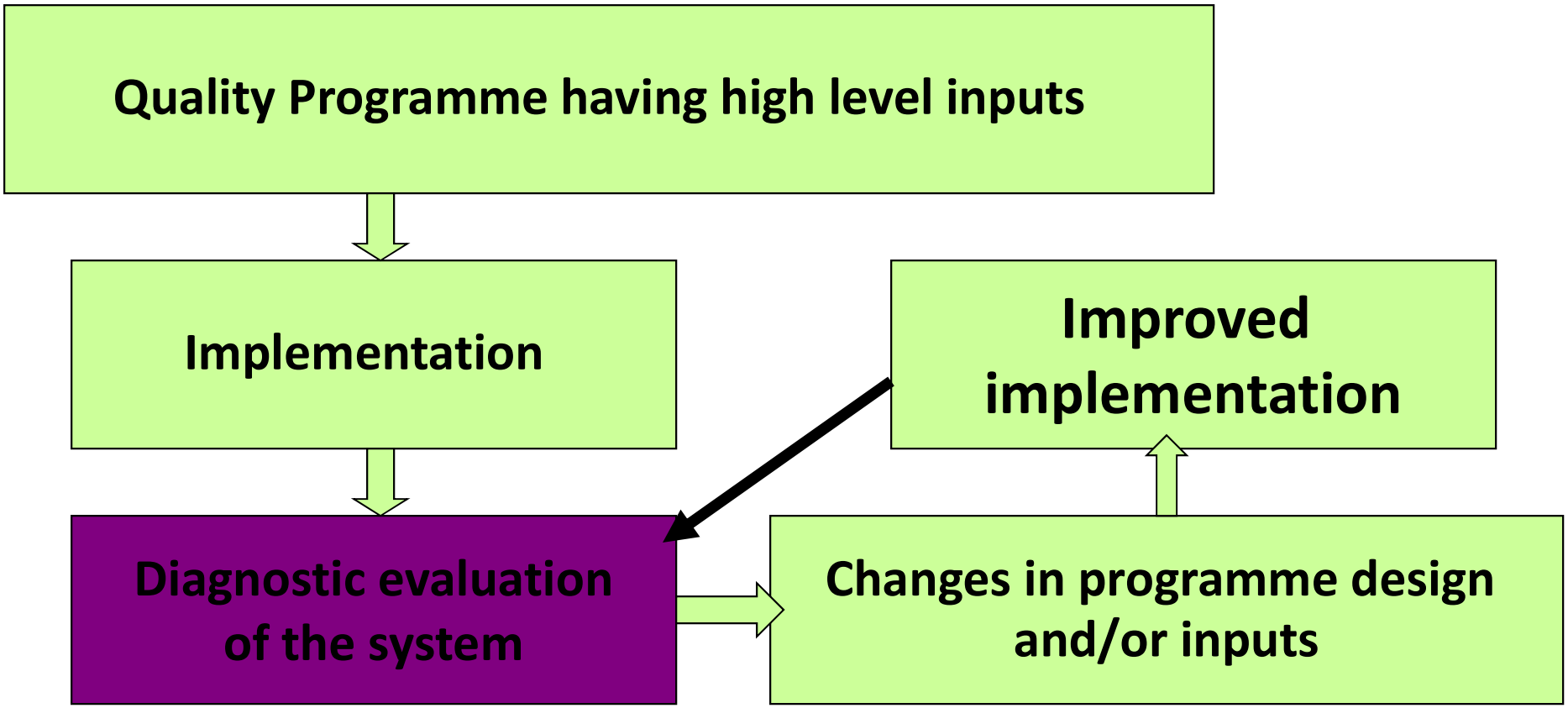
Mass Quality Programme

- Objective :
  - » 100% children
  - » 100% teachers
  - » 100% schools
  - » Sustainability
- Pedagogy for 'Every Child's Learning'.
- Systems for mass implementation
- Measurable and verifiable evaluation of childrens' achievements and of systems

Universalization as a scientific problem

Universalization must be seen as a scientific problem. This means that it must be taken up with the same seriousness with which we send humans into space, or rockets to the moon, or with which we eliminate diseases like polio and small pox.

Process for Continuous improvement through successive approximations



The Problem of Universalization in India :

How to reach two hundred millions of children through millions of teachers in a million schools?

A possible approach :

DEMO SEED MODEL WITH A WELL DEFINED ROAD MAP

A Roadmap with Demo Seed Model for a state
(80000 schools)

- Introduce rigorously in 400 schools (or more) during first year. Create SEED SUCCESSES in these schools
- Capacity building of pathfinder teachers and officers selected for this process
- Upscale to 4000 schools with the help of this team during the second year
- Upscale to 40000 schools during the third year
- Extend to all schools

There is no Shortcut.

The only way is to
CREATE SEED SUCCESSES in each block
and to GENERALISE THEM

through Rigorous Systematic Intensive Programme
for a minimum period of 4-5 years

DEMO SEED MODEL is necessary because

- It is important to show successes in realistic situations.

- One of the most serious obstacles in achieving 'Quality Education for All' is the mindset that “quality education is not possible in the real circumstances on the ground, so let us do what is possible”. This is a prescription for business as usual, lowering standards and passing the buck.

Importance of motivation

- Implementation at a mass level will require the sincere efforts of hundreds of thousands of teachers and administrators
- Therefore systematic plan for building motivation of all stakeholders must be integral part of the Road Map
- Capacity building including motivation must precede assessment. An honest picture can only come from motivated persons.

Navnirmiti Learning Foundation

Quality for Equality

Navnirmiti is a Self- Reliant Organization (SRO)

Working to Promote

- Universalization of Quality Education
- Viable and Decent Employment
- Cooperation
- Science for All
- A Scientific, Secular Culture

UAM Collective

- This is a collective of like-minded organizations and individuals working for Universalization of Mathematics Education as part of UAM programme.

- ALL MATERIALS PREPARED BY US ARE AVAILABLE ON OUR WEBSITE IN FREELY DOWNLOADABLE FORM UNDER COPYLEFT LICENCE

www.navnirmitilearning.org

Thank You!

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