

# **Education in India**

## **Kumu Script**

March 12, 2017

# 1 Introduction

This talk is about the state of the K 12 Education System in India in terms of the problems it currently creates, the reasons why those problems are created and the potential remedies for it.

We will use illustrations from a representation of these three features created in Kumu ([www.kumu.io](http://www.kumu.io)) which contains facilities for connecting the elements of a system with directed arrows. When an increase in the source element creates a change in the directed element and that is in the same direction, it is indicated by a blue arrow. Where it is the inverse it is a red arrow.

We start with describing the outcomes. Perhaps the most important one is that there is a mismatch between the skills that jobs require and the skills that our schools provide.

This also means that the number of jobs available is much greater than the candidates who get recruited for jobs.

Such outcomes do not encourage young people to continue at school. As a result those who finish school are a small percentage of those who start school.

More importantly, many graduates do not have real world skills like being able to make competent decisions and the ability to apply what they have learned to new situations, often referred to as inferential skills. Both these are essential if students do not have the chance to continue into higher education or get a job, but instead have to become entrepreneurs.

Finally, another important outcome is that as teachers are not motivated by a system of education that performs poorly at best, the best do not enter the education system leading thereby to teachers with a poor quality of delivery

## 2 Observations

The arrows are colored red or blue. Red indicates the the change of the elements connected is an inverse change i.e. as the state of one element increases the state of the other decreases.

The Outcomes of the current system have been defined both by the description and the state of that parameter. The state is indicated in brackets. In such cases it is this state which is compared with the state of the connected element.

### 2.1 Primary Outcomes of Existing System

The outcomes of the education system generally speaking are:

1. JobSkills (Mismatch) i.e. the Job skills inculcated do not match the needs of academia/industry
2. Jobs/Recruited(High): This is the ratio between the available jobs and the number of people recruited with the skills needed to fill them.
3. EntreprenSkills (Low): This is the level (Low) of entrepreneurial skills of students graduating from the educational system
4. InferenceSkills (Low): If inference is defined as the ability to apply what has been learned to new contexts then this level is Low as an output of the educational system.
5. DecisionSkills (Low): The ability to take good decisions in real life environments where the problem is often complex and the data is not necessarily accurate or comprehensive needs to be high but is currently low in those graduating from the school system.
6. Finish/Start School (Low): This is the ratio between the numbers who start school vs those who complete their school education.
7. TeacherQual (Poor): This refers to the quality of teachers which is currently poor. The prime reasons are the current education system as well as the tendency of graduates to go for more lucrative/challenging jobs compared to teaching.

### 2.2 Primary problems of the Education system connected to the outcomes

1. Syllabus (Low relevance): In India there are two central boards and many state boards of education. The central boards tend to be preferred by English medium schools but all English medium schools cannot afford the infrastructure or standards that these call for. The standards of most state boards are far lower and through the medium of instruction - the language of the state - deny children access to English language capability and thereby access to the richness of the Internet.
2. Motivation (Low): The relative irrelevance of the syllabus to jobs or academia, the focus of the exams, and to a certain extent the inputs into this system - largely those who cannot afford private schools - conspire to create low motivation. In reality the poor teacher quality and the fact that in Government schools there is security of tenure for teachers makes this a powerful factor in lowering student motivation
3. Infra (Poor): The poor quality of infrastructure in Govt. schools leads to two other major problems i.e. absence or shortage of toilets for girls, and - especially in the urban context - high class densities are damaging to the system as a whole.

4. GirlsToilets (Low): The relative absence of girls toilets implies pressure for girls to leave school at puberty i.e. about Class 6. The need to take care of younger siblings and the absence of security in poor societies for adolescent girls accentuate this trend.
5. ClassDensity(High): Summer heat makes a poor partner for high class densities combined with poor infrastructure. Among other things this leads to the need for severe methods of keeping discipline in the classroom.
6. Discipline(HighFocus): Many teachers see the maintenance of discipline as a prime focus of their efforts. In effect this kills interaction which leads to boredom which leads to loss of motivation.
7. ExamFocus(High): This may not necessarily be a bad thing but exams are poorly designed, and primarily used as a method of ranking rather than as a generative mechanisms or to obtain feedback on what needs to be improved.
8. CumSkillsFailure(High): At the Grade 5 or 6 level it appears to me that the failure to understand the fundamental particularly in Maths becomes very difficult to remediate. In a recent instance in a government school, Grade 8 students could not divide a two digit number by 10. This cumulative failure of
9. Content Delivery (Poor): Teachers are not skilled in delivery of content. Interaction is limited as class sizes are large and space is tight. Content is tightly prescribed by textbooks which have little instructional or entertainment value.
10. Meaningless competition (High): There is a very high premium on "Coming First". The implied element is "No matter how". This has implications also for ethics, honesty and real learning. More importantly it engages children in meaningless competition. Examinations are frequently designed to be marked easily and therefore do not lend themselves to gray area responses.
11. Teamwork (Poor): There are few avenues for collaborative work which is the mainstay for performance in industry and academia. Meaningless competition actively

## 2.3 The AGEM impact

The AGEM impact is achieved through the use of less than an average of 1 hour per day of school time from Grades 6 to 12. The key elements of the AGEM impact are:

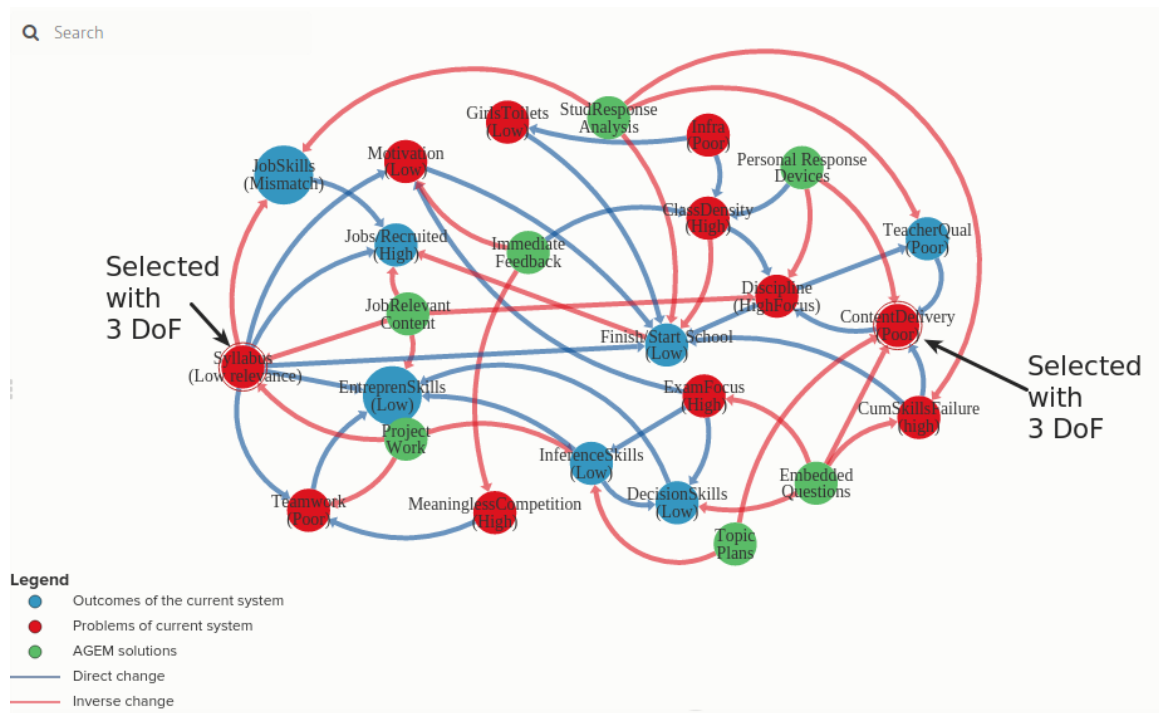
1. Personal Response Devices: These are wireless keyboard which will soon be replaced with android phones suitably altered to meet AGEM functions.
2. Job relevant content: Content includes from Grades 6 to 8 only Maths, English, Systems Thinking and Project work. For Grades 9 to 12, these will be augmented by Statistical and Python programming, Digital democracy, Entrepreneurship and participation in a nano degree course.
3. Topic Plans: These contain carefully researched content within a multimedia document that is projected on the wall.
4. Embedded Questions: Topic Plans contain embedded questions that are answered in parallel by all students. The responses are designed for several purposes such as to reinforce taught content, develop generative assessment, evaluate lesson quality etc.
5. Immediate feedback: This is typically a graphical analysis of the response of the class as a whole. It does not identify any responder and is used to generate discussion about the nature of the class response.
6. Student Response Analysis: All responses to each question are archived and analyzed to find ways to best support the performance of the individual learner as well as to fine tune Topic Plans.

7. Project work: This will vary from analyzing projectile motion to developing mathematical models in the later years. The intent is to strengthen real life problem solving through exploiting the opportunities offered by inter-disciplinary work.

## 2.4 Insights

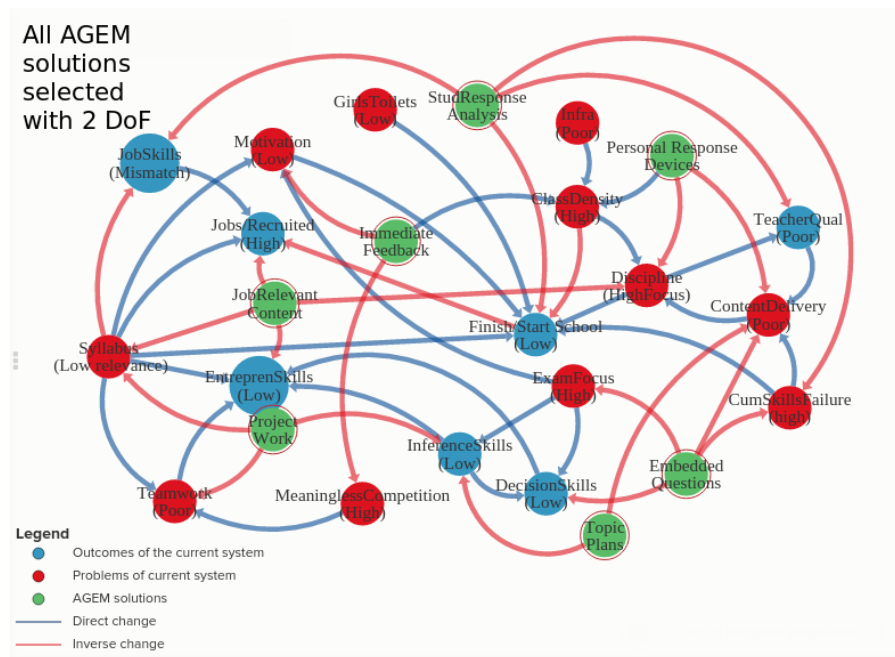
### 2.4.1 Syllabus and Content Delivery

The Syllabus and Content Delivery problems have 8 and 7 Degrees of Freedom(DoF) respectively. When both are selected with 3 degrees of freedom they capture every element of the diagram.

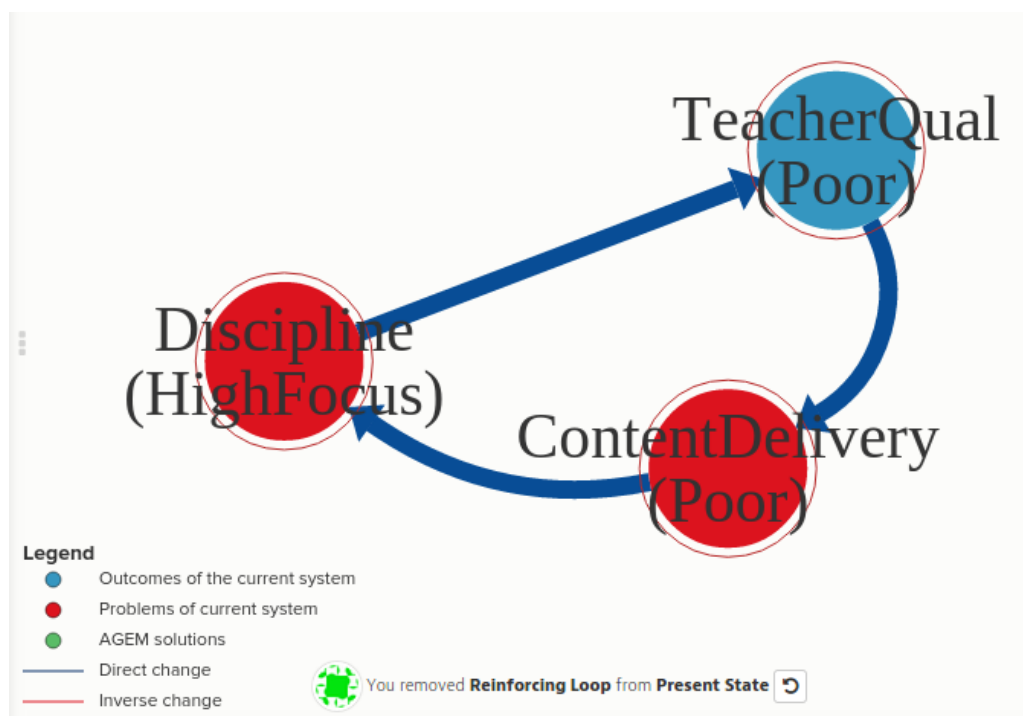


### 2.4.2 AGEM solutions

Selecting all the AGEM solutions with 3 DoF leads to all elements of the diagram being captured. With 2 DoF only the GirlsToilets/Infra connection is left out.



### 2.4.3 R1 - A critical reinforcing loop



Poor teacher quality is a product of the system for several reasons. Firstly, the best teachers are unlikely to go to Govt. schools where there is less scope for professional advancement. Security of tenure in government schools often attracts teachers who are otherwise unsuitable but may pay large bribes to get the job. Statistics published over the years often show that a teacher is present in class only about 50% of the time. As the salaries are relatively high and funds are relatively low, a lot of the work is done by supply teachers who are hired for a fraction of the salary thereby reducing standards further. Hence, a low quality input to the teaching profession in government schools is the norm.

Understandably content delivery is poor and content is itself largely irrelevant. This creates boredom in classrooms. That issue is addressed by enforcing strict discipline in the classroom, effectively putting an end to questioning. That of course means reduced student engagement which is buttressed by repetitive homework, rote learning and increased boredom. That makes the teacher's job simpler and reduces the quality of delivery.

Such a reinforcing loop impacts the system to provide less knowledgeable students thereby making for a less knowledgeable subset of students who will come into the system as teachers.