K-12 Reform in India

AGEM - the game changer

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1 Introduction

Overcoming the Crisis of Competence that checkmates social and economic progress in India has become more urgent with the escalating rate of social change. The AGEM project will engage adolescent students at an age when they are most receptive, to experience the excitement of engagement; of teamwork; of decision making, and of participatory decision making. These address the needs of today's workplace and University environment. AGEM will use technology, pre-prepared content with embedded questions, wireless feedback devices, and Google quality analysis to empower students, teachers and schools. All this at a rate of USD4 per student per month when at scale.

That education will be effective because it will allow our children to apply knowledge gained to new circumstances, make competent decisions and work effectively with others in teams to take participative decisions. The progress they make will be measured daily through the use of technology and by archiving these measurements we will have an audit trail for each child that we will use for analysis, improving performance and providing career guidance. The AGEM product has 4 facets which are closely linked.

- carefully researched content in a multimedia package which contains embedded questions
- a wireless feedback device for each student which more than a hundred students can use simultaneously to answer the embedded questions
- feedback - both immediately provided, and archived for later analysis
- a competent presenter whose video is included in the multimedia package to explain core content.

These four elements need a teacher with limited domain knowledge to conduct this orchestra. We need less than 30 hours in any subject to show measurable progress against a control group, and we believe we can make schools more effective by teaching just three subjects for a total of 6 hours a week.

The size of the primary target market is about 6 million students who populate the 7000+ schools that use the Central Board of Secondary Education's (CBSE)[1] system. The secondary market comprises State and Municipal Government schools. These represent some of the poorest performing schools in the country, and constitute a vast market but present the challenge of working with Governments.

Our Pilot has permitted a Mathematics class of Grade 6 children to increase average scores from 24% to 75%(Pilot-AGEM assessment) after about 35 hours of student contact, and also show progress in English and Science compared to a control group.(Pilot-School assessment)

Most importantly, while average scores have improved with each Topic Plan the gap between the strongest and weakest has declined with each topic plan.(Pilot-AGEM assessment)

2 Is this a viable opportunity for a business?

We work on the premise that businesses ideally need to make money through providing a service that improves life for members of a community.

2.1 What are the points of pain in the system?

We see several pain points in education in India.

- Class sizes are large, effectiveness is low, and measurement is not scientific.
- Students do not actively participate in class discussions, and do not have decision-making skills.
- Students are not prepared for the job world, and aren't engaged in the classroom
- Students see text books as limits to the knowledge they need to acquire and examination success as the only goal.
- Tracking student performance is slow and cumbersome – students and parents aren't given the progress info they need on a timely basis
- Nationally more than 60% of students drop out between Grade 1 and Grade 10. At least some of these are the result of boredom and the gap between what is taught and what is useful.

[1] The primary Board for Secondary Education in India

AGEM processes overcome these points of pain through consistent engagement of each child in a collaborative environment using feedback devices and representations, carefully researched materials, and through targeting core competencies in Mathematics, English and Systems Thinking, whose impact overflows into other subjects and strengthens personal motivation. Finally, AGEM systems work better in larger classes and provide immediate feedback as well as periodic reports of the analysis of strengths and weaknesses using archived data.

3 The AGEM value proposition

The AGEM approach will increase student engagement within larger classes to enhance student's abilities for inference, decision making and participative decision making, while generating hourly performance data for each student to allow each child's performance to be assessed and analyzed for remedial action.

Figure 1: An AGEM class for 65 students during the Pilot using feedback devices

The AGEM approach requires no textbooks, no homework, and no examinations. It matches the requirements of CBSE's Comprehensive and Continuous Evaluation (CCE) approach, and saves teacher time in preparation, marking and CCE assessment.

Most importantly, the AGEM system can serve a virtually unlimited number of schools across the country. The larger the system gets the greater are the learnings from student responses leading thereby to an improving quality of materials. Finally, the cost of provision will decline from USD6 to USD4 per month per student as the number of subscribing students increase.

4 Is there a market for this service?

Currently there are over 1 million schools in India catering to more than 219 million students. This represents a private spend of about 20 billion dollars for the K12 space. That has now been estimated to rise to about 45 billion dollars by 2015. The three principal players in terms of Market Capitalization are CORE Education, Educomp, and NIIT. None of these provide in the public domain data about the increment of performance created by their products. AGEM's product is unique in that sense as measurement, feedback, analysis and learning are seamlessly integrated.

4.1 How is the market segmented from the AGEM perspective

From our perspective the primary segments are on the basis of Central and State Examination Boards. To integrate into a school we need to integrate with Examining Board requirements at some point. CBSE has introduced a Comprehensive and Continuous Evaluation (CCE) requirement which represents a significant pain point for teachers and schools.[2] The AGEM system is a near perfect fit for this system. Hence, the more than 7000 schools that catered to more than 800,000 Class XII applicants in 2012 represent our primary target market. These tend to be urban or metropolitan schools which use English as the primary medium. These constitute a market of more than 4 million children in Grades 6 to 12.

[2] we discovered when we received feedback from 32 principals of India's most successful public schools which cater exclusively to staff of the Atomic Energy Department

4.2 How do we enter the market

Our first foray in the market would be in Bangalore and after that the other metropolitan areas of Mumbai, Calcutta, Delhi and Chennai. Within these areas, we would target schools that lie at the lower end of performance typically charging students about USD30 to USD 100 per month. Class sizes would need to be not less than 30 students, and there would typically be more than two sections in each grade. We would begin by serving Grades 6 to 8 and then work with the cohort upto Grade 12. We believe that the AGEM impact would be to make them stronger competition for the next rung of performing schools who would then become potential customers.

Our secondary longer term market would be Government schools in the State of Karnataka to begin with. These schools are run by state or municipal governments and are marked by poor attendance of teachers and students, poor infrastructure, and poor exam results. They provide the potential for massive increments in performance due to the large numbers and poor quality. There are more than 5000 such schools in the State of Karnataka. They offer the advantage of a mass rollout across a state where a state government buys into the AGEM. Creating that relationship with municipal or state governments would be a longer term effort but governments are keen now to find better solutions and to find the resources to fund those solutions.

4.3 Can the market afford this service?

As AGEM's products require no books, no homework and can work without expert teachers, affordability has to be evaluated in that context.

4.3.1 Private schools

School fees for private schools are typically between USD10 to USD 4000 per month per student. However, there is a tendency to have extra charges for extra facilities. Across India that would be about 70,000 schools catering to 88 million students. Most private schools would be able to afford our product. Discussions with 3 schools in Bangalore have centered on about USD5 per month for 1 hour a week as opposed to 3 hours.

4.3.2 Government schools

While evidence about operating costs of government schools is rare, these costs are estimated at between USD 15 to USD30 per month per student. In addition the Govt. has several schemes to support additional provision like the Sarva Shiksha Abhiyan and now the Rastriya Madhyamik Shiksha Abhiyan (RMSA) scheme. This would amount to about 930,000 schools catering to about 132 million students. There is an increasing trend of Public Private Partnerships (PPP) and it is not unreasonable that within a wider contract AGEM's fee structure can be accommodated. In the XI Plan the Govt. has increased expenditure on education by just under 4 times compared to the X Plan.

4.4 Is there a demand for this service?

Across the nation there is movement from free government schools to relatively expensive private schools.[3] The private sector spends about USD 20 billion on 7% of schools that cater to 40% of enrollments while Govt. spends less than USD 30 Billion on the remainder.[4]Education is largely a fragmented industry with more than 95% held by the unorganized sector[5].The absence of performance increments, the inability to scale, and the sensitivity of technology to electric supplies, are prime reasons why current interventions have failed or been constrained.

The Govt. is trying to enforce a 25% reservation in private schools for the poor but is meeting widespread resistance. This in itself opens up a pain point for private schools which the AGEM system can impact.

Both in the context of Government and private schools the scope for revenue is significant within the USD45 Billion market projected for 2015.

From a different perspective, the demand for this service has been voiced by children who have been through the experience. The most telling was when we were faced with Grade 9 and 10 children instead of the Grade 5 children we expected at a demonstration lesson in Chennai, India. We rendered the first Topic Plan for Grade 5 to these senior students and at the end they wrote down their perceptions at our request. These are available here and are best iconised by the following statement:

> At first I thought it would be silly to learn 5th standard portions but the way they taught it was awesome. I feel like reading from 5th for another time.

[3]http://articles.timesofindia.indiatimes.com/2012-03-30/bangalore/31260660_1_government-schools-govt-schools-private-schools
[4]http://slideshare.net/kittukolluri/
[5]http://www.mit-ef.in/uploads/mitenterprise/Events/India%20Education%20Landscape%20-%20Anand%20Ramanathan.pdf

4.5 What are the barriers to entry?

Fig. 1 depicts response of a class of 65[6] to the AGEM system. However, while children are the one's impacted by education systems, they have no voice in the choice of system. Similarly, teachers show unremitting attention in this video, yet they do not make decisions either. In one instance, we presented a demo lesson to a class in a small town in Andhra Pradesh. The informal but self regulated behaviour of children in an AGEM classroom is visible in this video.

The choice of system is often dictated by the consistency and length of relationships with key personnel. Our strategies will therefore ensure entry to both private and Government schools through other mechanisms once funding is received. We remain confident that children, their parents and teachers will be able to secure retention of the system once it is in place.

4.6 What is the AGEM advantage?

AGEM systems centralize content development with the best resources possible so that information is structured in a coherent sequence to develop inference, generate knowledge and build "skilled intuition".

AGEM systems can run on a truck battery for 8 hours a day and batteries for feedback devices can run for more than a year without charge.

Most importantly, children see the results of their responses to questions within seconds of responding but without being identified with a wrong answer.

AGEM can calculate every day the results of individual, teacher, and content performance and can take remedial action. There is no evidence of a similar ability in competing products which can be scaled at AGEM prices.

5 How can we develop this business opportunity

5.1 How is the value proposition to be achieved?

AGEM achieves the value proposition by providing carefully researched content in a multimedia format for projection, which contains embedded questions which students respond to with low power drain wireless feedback devices e.g. batteries would last more than one year. The nature of the process is to develop inferential capability in small steps. The feedback is analysed and a graphic representation is projected which preserves the confidentiality of individual responses and serves to make students aware of the profile of responses and the correctness of the desired response. Each question provides opportunities for decision making and in some cases complex decision making and in every case feedback of performance is immediate and confidential. In other cases, the feedback response will serve as a discussion medium guided by the teacher who may elicit additional responses. This often invokes the need for participative decision making. Crucially, every student is engaged in the class as each student's input is analysed and reflected in the feedback representation.

The AGEM system will in the initial stages target grades 6 to 8 to provide instruction in Maths, English and Systems thinking for a total of 6 hours a week. This requirement for one hour a day could be supplementary to the academic timetable in the beginning and be integrated later.

5.2 What has been done?

5.2.1 The initiatives

We have developed our current AGEM processes over the last 14 years. This has involved opening two schools in Bangalore[7], working for short periods with children in 5 states of rural and urban India testing different generations of our technologies[8] [9]; conducting evaluation interviews with about 200 people using our feedback systems, auditing several international schools across India[10], and conducting a pilot of the efficacy of our methods [11]

[6] not all 65 are visible in this photo due to the shape of the room and the azimuthal coverage of the camera
[7] Vidyashilp Academy (http://www.vidyashilp.com/) and Trio World School(www.trioworldschool.com)
[8] http://www.agem.in/pdf/CLSEA.pdf,http://manthanaward.org/section_full_story.asp?id=455
[9] http://www.agem.in/pdf/cEdK12_VietnamStudFdbk.pdf
[10] Consultant, University of Cambridge International Examinations (CIE)
[11] http://www.agem.in/pdf/cEdK12_OAP_Pilot.pdf

5.2.2 The outcomes

Our low power drain processes and technologies have evolved over several years. On the technology front we have developed wireless feedback devices which allow over a hundred children to provide parallel inputs to a question using full keyboard facilities. On the software front we have sophisticated ways of representing the inputs of the group as a whole to create in many instances the points of discussion. On the content front, we have mechanisms for creating Topic Plans which can extend over several hours of multiple class sessions. These Topic plans use all forms of media including simulations and contain embedded questions which form the basis for analysis both for immediate feedback as well as for monthly reports and career guidance.

5.2.3 The learnings

Our primary learnings are that:

- engagement of children in the learning process eliminates indiscipline.
- for adolescent children, replacing the boredom of current classrooms with the engagement of AGEM classrooms provides spectacular outcomes.
- the urgent need is for teaching only Mathematics, English and Systems Thinking as a first initiative.[12]
- children can develop the primary capacities we strive for i.e. inference, decision making and participative decision making

5.2.4 The Pilot

We conducted a pilot to evaluate AGEM systems by conducting a Grade 6 Mathematics program for 22 children at the Maria Niketan School where the fees are about USD6 per month. That Pilot yielded the following principal outcomes:

Behaviour: complete absence of disciplinary problems coupled with near total engagement.[13]

AGEM tests: increase in placement test average scores from 24% to 75%.(Pilot-AGEM assessment)

Independent end of term tests by school: average change in scores after our Pilot, comparing the taught group to rest of the class was 7.5% vs 2.7% for maths. The course impact seemed to have overflowed into Science (13.8% vs 10.3%) and English (9.9% vs 9.4%).(Pilot-School assessment)

5.2.5 How do stakeholders benefit from the AGEM process?

The characteristics of the AGEM process are:

- it is highly scalable
- it saves teachers preparation time, examination time and effort, and provides a more exciting teaching experience. Large classes become an advantage due to the better quality of representations that ensue.
- students are engaged, do better in class, have higher self esteem as individual performance is kept confidential, do better in other subjects, and learn to work as a team. It also reduces the weight of their school bags as there are no textbooks and no homework. They are happier as assessment is a third party unbiased scientific process.
- Principals and administrators receive regular and precise feedback on how the student, the teacher and school systems can be improved.
- Parents can expect to see a qualitative and quantitative improvement. They can expect to be notified when a child's performance changes suddenly or some new talent is identified.
- All stakeholders can expect a lower cost of education and higher quality.

[12] www.agem.in/pdf/BriefReport.pdf demonstrates enhancements in Science and English in School term examinations when only Maths was taught through our program isolated from the main curriculum.

[13] About 18 hours of class videos available focused on students

5.3 What needs to be done?

We currently have the hardware to serve 5 classes of 50 students simultaneously. We also currently have design specifications for the next generation of feedback devices, and the other infrastructure required to allow us to provide our service to hundreds of schools subject to prototyping, manufacture, installation and testing.

We have identified excellent team members both in India and overseas who would take forward the task with passion and competence. We already have considerable experience with hardware and software. We have identified manufacturers in the traditional centers in East Asia who would provide the bulk manufacturing to our design.

6 What is the support required?

AGEM requires an investment of USD1 million spread over two years. ROI is achieved in Year 3 and cumulative profits are about USD30 million in Year 5. A detailed financial statement is available.

7 Why should an investor invest?

While we expect the AGEM system to rejuvenate the process of education, and to generate a generous return on income, we believe the investor's commitment will be driven by the sheer potential impact of this project on the developing world. Meaningful education can expect to address issues ranging from having a trainable workforce, to enabling citizen participation in governance.

The AGEM system allows all educational materials to be tuned daily on the basis of feedback responses to make them better every time they are used. These responses will become in time the largest database of human performance, and in seven years time when the first cohort graduates, graduating students will have the benefit of Google quality analytics to help them decide what to do, and to help employers know how to deploy them most effectively. In the end, that may be an investor's greatest dividend.

8 Conclusions

The time is ripe for the AGEM approach to education, as Govt. and the general public increasingly recognize the relationship between education and wealth creation. The AGEM system permits scalable, affordable, effective and measurable education at a lower price while providing quality assured, meaningful education for the K12 sector.