

# **An Evaluation Study of Mobile Science Labs and Science Centers in Karnataka State**

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## OBJECTIVES

- Examine variety and diversity of Agastya interventions (MSLs, SCs, Science Fairs, Community Visits etc.)\*
- Examine regularity, punctuality and discipline observed by the MSLs
- Examine the harmony with syllabus requirements
- Get feedback from schools, head teachers, students, parents, community members on utility and quality of services of SCs and MSLs
- Examine quality of lab facilities in schools served by MSLs
- Review in-house and departmental monitoring of progress of SCs and MSLs

\* MSL = Mobile Science Lab, SC = Science Center

## TARGET SAMPLE

- **2048 children** (Grades 5,6,7,8)
- **256 teachers**
- **256 schools**
- **256 community members**
- **24 districts, 8 in-depth**

***Study period: March - May, 2012***

*\* Sample covered 10% of MSL/SC beneficiaries at each level (state, district, block)*

## APPROACH AND RESEARCH METHODOLOGY

- **Desk Research** including records available with government (SSA, SPO/DPO/BRC/CRC)
- **Interviews with government officers** at State, District, Block and Cluster levels
- **Primary data collection**
- **Structured and unstructured observation** of MSL/SC activities
- **Focus Group Discussions** (Headmaster, Teacher, Community members, Parents, Children, SDMCs)
- **Case Studies**

## STUDY EXCERPTS

*Agastya Foundation supplements the science education children receive in schools, which is very much focused on memorization, thus discouraging creativity and, consequently, true mastery of scientific theory (Executive Summary P. iii).*

*Agastya from the very beginning had realized the importance of scale to achieve impact. It ensured this through two key components in the program – the use of mobile vans which take science to the doorstep of rural children, and collaboration with state Governments to ensure that it was able to access government schools in various districts (P. 87)*

*The Agastya model is a unique initiative that takes science learning out of the classroom and provides children with the opportunity to observe, understand and absorb concepts through a hands-on practical approach (Executive Summary P. iii).*

*In spite of being a relatively young organization, the impact of Agastya 's efforts is already being felt. Studies in schools and anecdotal information show a significant change in student attitudes, educational uptake and improvement in overall performance. Children describe how, for some, Agastya was the first time they got to appreciate science and its application in the world around us. More importantly, children have developed an intellectual curiosity and willingness to examine, question and explore on their own. The young instructors have developed a sense of assurance that was otherwise missing. Young girls command attention and respect from their students. (P. 87)*

## STUDY EXCERPTS

*The MSL has been demonstrated as a stimulating, purposeful program different from the regular school year. It has given the student a block of time in which to pursue a particular project without interruption of bells and jumping from one subject to another an opportunity to follow an interest of his own choice with the help of special teachers, equipment, and scientific tools and techniques (P. 62).*

*MSL program was a huge success particularly with regard to the scientific opportunities offered to children (P. 59)*

*Exposure to the MSL yields increased benefits to students at each grade level... the benefits increased every year (P. 59)*

*Those students who had progressed through all 3 visits of the MSL were able to develop a more balanced science project in terms of accomplishment in each of the project sections (P. 60)*

*Comparison of grade level students with similar backgrounds differentiated principally by more exposure to the MSL presents conclusive evidence of MSL application in providing expanded science education benefits (P. 60)*

## TEACHERS OPINION ON SC/MSL ACTIVITIES

*There was a substantial increase in the student's capability to use equipment...and in experiment planning (P. 62)*

*In the case of elementary school teachers, the lab provided the only support (teachers) had in teaching their science program (P. 62)*

*With the use of the lab teachers are more committed to focus on science (P. 62)*

*The MSL ...is a stimulating, purposeful program different from the regular school year. It has given the student a block of time in which to pursue a particular project without interruption of bells and jumping from one subject to another, an opportunity to follow an interest of his own choice with the help of special teachers, equipment and scientific tools and techniques (P. 62)*

*The payoff...comes in the change of attitude...in terms of better relationship with their children, new programs in the district, and better grades for their class. This district is a conservative one yet it is not doing conservative things. The only real variable in the science arena has been the MSL. There it appears that it is the causal thing that is changing some of the attitudes and ideas. (P. 62)*

## TEACHERS OPINION ON SC/MSL ACTIVITIES

*Teachers find the students more interested in science and better prepared to work in laboratory situations (P. 63)*

*The student after participating in the MSL program demonstrates a better understanding of science...the MSL provides an important motivational device for accomplishment in science learning....there is a carry over of this interest in learning to other subjects (P. 63)*

*Most (teachers) said that the MSL program as constituted was an excellent program for their students (P. 63)*

*Teachers felt that the impact of the MSL was evident in increased student interest and understanding in science. Teachers saw an increased appreciation of the outdoors and of conservation while some noted that there was more individual experimentation and that more self-discovery and self directed activity was occurring (P. 64)*

*Teachers felt that one benefit of the program was that of organized physical activity (P. 64)*

**73.4%** agree that Mobile Laboratory enriches normal content (P. 71)

**61.7%** agree that MSL content covers topics already in the curriculum (P. 71)

**67.5%** agree that MSL gives insight into the scientific method (P. 71)

**77.7%** report that students show willingness to change ideas based on evidence (P. 73)

**71.1%** agree that MSL (positively impacts) curiosity, interest and enjoyment in their science work (P. 73)

**62.8%** agree that the MSL helps students think critically and logically in analyzing and interpreting evidence and drawing conclusions (P. 73)



## STUDENTS OPINION ON SC/MCL ACTIVITIES

*There are at present no laboratory facilities at the elementary level...The MSL allows the student to move away from the textbook approach to science toward the operational approach which is more interesting and instructive (P. 65)*

*Students are now able to become familiar with the problems involved in planning and developing an experiment outside the classroom in more or less of a real world situation (P. 65)*

*Skills that were applicable beyond the MSL were also learned such as how to use reference materials, how to work in small and large groups for task accomplishment. Observation skills were emphasized (P. 65)*

*Listening skills were the most improved (P. 65)*

*Self reliance and a sense of responsibility were mentioned by many students as a direct outgrowth of their work in the MSL program (P. 66)*

**88.9%** agree that MSL has many interesting experiments that helped with their school curriculum (P. 74)

**79.6%** agree that the MSL staff were good at explaining the experimental activities (P. 74)

**84.2%** agree that they learnt a lot about science on visiting science centers (P. 75)

**85.2%** agree that the MSL has made them curious and enthusiastic about using new equipment (P. 74)

**67.1%** said that the MSL made them know more about science in their daily life (P. 75)

**60.4%** said the MSL has helped them understand science lessons better (P. 75)

**76.2%** said they would really like to visit the MSL again (P. 75)

## COMMUNITY MEMBERS/PARENTS OPINION ON SC/MCL ACTIVITIES

*A Young Instructor Leader trained by Agastya exclaimed, “A tree to a home makes a forest to the village. We must grow trees and save the earth”, after a night community visit. (P. 57)*

*Community members noted that their children very frequently discussed experiments that they had observed or performed in the MSL (P. 67)*

*The children expressed new interests promoted through the MSL program such as collecting scientific knowledge about phenomena in daily life (P. 67)*

*Parent-child discussions involved specific experiments, skills using using scientific equipment and new interests stimulated by using the MSL (P. 67)*

*66% stated that they wanted their children to participate in the science fair/exhibition program (P. 67)*

**83%** *believed that the MSL engendered increased respect for nature and natural science (P. 68)*

**65%** *felt that they saw increased self-improvement and social maturity in their child (P. 68)*

**58%** *felt that participation in the MSL (positively) influenced the grades of their children (P. 68)*

**51%** *felt that the program fulfilled recreational needs (P. 68)*

**44%** *felt that hobbies and out of school activities of children were (positively) influenced (P. 68)*

**47%** *felt that the selection of science courses had been (positively) affected by the science center*

**19%** *felt that their children's future jobs or professions were influenced (P. 68)*

## COMMUNITY MEMBERS/PARENTS OPINION REGARDING IMPACT OF SC/MCL ACTIVITIES

*The most important thing to be gained from the MSL is exposure to ways of attacking and solving problems (P. 69)*

*The MSL program had significant learning impact on the community members who participated in it (P. 69)*

**57.1%** *agreed there was a positive impact on the gross income of the community through the cultivation of medicinal plants (P. 77)*

**53.6%** *felt that visiting the MSL has made them more interested in science (P. 77)*

**68.7%** *agreed that the MSL (focuses on) concepts that are relevant to the villagers (P. 76)*

**82.4%** *learnt a lot about science when visiting the science center (P 76)*

**69.5%** *agreed that they know more about scientific phenomena in their daily lives after participating in Agastya activities. (P 77)*

**67.9%** *agreed that Agastya provides more platforms for students to use their technical and creative ingenuity to address urgent social challenges in their communities (P. 77)*

**64.8%** *said that Agastya has grown a new generation of environmentally conscious citizens (P. 77)*

## YOUNG INSTRUCTOR LEADER PROGRAM AND SUMMER CAMPS

*Science fairs target a large audience of 15,000 children. In addition, they serve as a platform to encourage young instructors to demonstrate to their peers. This boosts confidence and improves their communication skills (Executive Summary P. vi)*

*YILs\* are actively encouraged to create their own teaching learning methodologies. These processes allow YILs to develop management skills and set their path towards becoming effective future leaders (Executive Summary P. vi)*

*Students are really learning how to teach science, and how to make it fun, and to meet every individual's needs in the classroom (P. 56)*

*" Being able to learn the theory of teaching science and actually teaching science are completely different ball games" (P. 56)*

*"Being able to know how important...it is to be inquiry-based and having students creating information as students rather than being given information by a teacher, they will remember that, and they will be using that as their education progresses" (P. 56)*

\* YIL = Young Instructor Leader

## TEACHERS OPINION ON AGASTYA'S TEACHER TRAINING PROGRAM

*"I have tried to adopt some of their techniques in my teaching. I would recommend Agastya to all teachers. If possible, they should bring their children to the Science Center to observe experiments. It would be most beneficial"* K V Hakkali, Science Teacher, Government Higher Primary School, Kukanoor, Karnataka (P. 55)

*"The information was very useful to me, as I am an Arts student. I can now understand the basic science concepts well and feel more confident about explaining them to my students."* HV Nagaraj, Heroor HPS, Kunigal Taluk, Karnataka (P. 55)

*Agastya experts taught this session using a laptop and LCD projector with brilliant moving images of the globe, particular weather patterns, physical and chemical changes in matter, human body part, ecosystem, etc. This was a great way to inspire the teachers (P. 55)*

*The training session was a useful experience with teachers emphasizing their interest in teaching subjects in a holistic manner, look at the interrelation across different disciplines. (P. vii)*

**33.2%** believed that training is excellent (P. 55)

**58.3%** believed that training is good (P. 55)

**8.0%** believed that training is average or common (P. 55)

## CONCLUSIONS

Agastya's MSL and SC activities are achieving the following in schools:

- Increased interest in hands-on, experiential learning, including out-of-the-box questioning by children.
- Better understanding and retention of concepts among students.
- Better levels of interaction and communication amongst children. The peer-to-peer Young Instructor Leader program has reduced the fear of questioning, increased confidence and created positive spillovers with other children.
- Teachers have learned fresh perspectives, some have adapted Agastya's techniques and methods.
- Improved learning achievement.