ISBN: 978-81-941567-9-6
January 3-6, 2020
epiME 8

CONSCIOUS TEACHER TRAINING: SUPPORTING INNER DEVELOPMENT ALONG WITH DEVELOPING SKILLS AND COMPETENCIES

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The purpose of education is beyond fitting in (getting a job, being a good citizen) and standing out (having a successful career, being a critical thinker) it should allow children to simultaneously know themselves and embody values, notice patterns they want to shift in society and solve problems. What would be the qualities of the teacher, facilitator who can guide the students to be such leaders?

How can a technical teacher training program, in this case study, a course on the use of programming to learn Mathematics for teachers (educators), be designed to support these qualities in teachers? When such a design is implemented does it achieve its purpose of addressing not just skills (programming, solve problems), but competencies (how to use skills to change culture or shift systems), and inner capacities (working from embodying values)?

CONTEXT AND INTRODUCTION

Auroville is a universal township with a goal of realizing true human unity. Auroville belongs to humanity as a whole and works on physical and spiritual researchers required to achieve its goal.

STEM (Science Technology Engineering Mathematics) land – runs rural STEM centres in two outreach schools of Auroville – Udavi School and Isai Ambalam School. The children attending both Udavi and Isai Ambalam schools come from villages surrounding Auroville. The schools of Auroville and STEM land work on the philosophy of Integral Education based on the principles of Sri Aurobindo and the Mother.

Integral Education looks at holistic development of a child; developing and perfecting the physical, mental, vital (psychological, emotional) natures of a child to allow them to express their inner being in the world (Neeltje, 2001). This will not only benefit themselves (independent/individualistic), but also the world (interdependent/collective). Such an education addresses the purpose of education beyond fitting in and standing out.

The environment most suited for Integral Education is one where the child progressively learns about himself/

herself and can make choices on their own. This environment is broadly referred to as '**Free Progress**' system, where children are provided freedom make progress towards learning and understanding themselves deeply. At a practical level this appears as freedom with responsibility in learning. While the responsibility of learning rests with the child, it is the teacher/facilitator who has a big role in creating a meaningful learning environment and this role is far larger than that of a traditional didactic teacher. How this philosophy can be implemented is one of the challenges and the research carried out at Auroville Schools.

At STEM land in Udavi school children learn Mathematics, Electronics, 3D Printing, Programming (in Scratch, Alice, Geogebra), Mindstorms (Robotics) and play strategic games that enhance logical thinking. The children take responsibility of their learning (Ranganathan, et.al., 2017) and plan their goals each week related to their curriculum and beyond it. This self-directed learning is based on Sri Aurobindo's first True principle of education (Aurobindo, 1921); "*Nothing can be taught*". The children create projects that represent their mastery over concepts they learn and can share following constructionism (Papert, 1986). They work individually, in pairs or peer groups and ask for support from facilitators when they need it. At STEM land at Isai Ambalam school we work with younger children work on tangible real-life projects that impact their surroundings and school addressing Mathematics and EVS (Iyyanarappan, et.al., 2019).

Scaling: How can such a program be scaled to different contexts; different levels of skills of facilitators and varying availability of resources was one of the questions that drove this research. We felt that scaling what was special about STEM land was not the access to materials, or skilled staff, but the environment of taking responsibility of one's learning. Creating an environment where children can use freedom responsibly was not easy and required teachers or facilitators to have the courage to step beyond their socializations and create an environment that worked for the children and themselves. The goal was to avoid prescriptive top-down (or bottom up approach) to one that was inside-out with the teachers manifest what they care about deeply in their workspaces while being equipped with STEM skills.

This is an action research, the paper reflects on the design and implementation of a teacher training program that builds capacity through skills, competencies and inner capacities.

PRINCIPLES UNDERLINING THIS WORK

The focus of the paper is teachers/facilitators and their training. In this regard the principles of true education by Sri Aurobindo (Aurobindo, 1921). indicates that '*The teacher is not an instructor or taskmaster, he/she is a helper and a guide. His/Her business is to suggest and not to impose.*'

The NCF 2005 (Pal, et al., 2005) also states '*teacher plays a role of a facilitator, supports and encourages learning, involves active participation of learners, develops multidisciplinary curriculum, focuses on education, brings about multiple and divergent exposure, multifarious, continuous appraisal in educational system'* these are very high goals for which teacher's initiative and leadership is important.

Making projects (through programming) is a way for children to demonstrate their learning and offers an

alternative to examinations for assessment. Projects also offers an opportunity for self-evaluation and constant progress. Programming a computer helps children learn conceptual ideas as they need to break it down into small bites for a computer to follow. It also helps them visualize abstract concepts. They can also create their own games to develop rigor. Work on programming and learning Mathematics that has been carried out at STEM land and documented before and not repeated here (Ranganathan, et.al, 2015) is the basis of this course.

This 8-day program designed in line with capacity development to address sustainable and holistic results through a conscious full spectrum response (CFSR) (Monica, 2017, p. 236) as shown in Figure 1. A CSFR based capacity development simultaneously addresses.

1. immediate causes that requires technical solutions through skills
2. systems and cultural causes that require system and cultural transformation through competencies
3. underlying factors that require embodying values and being a transformational leader through inner capacities.

The figure also conveys the definitions of skills, competencies and inner capacities.

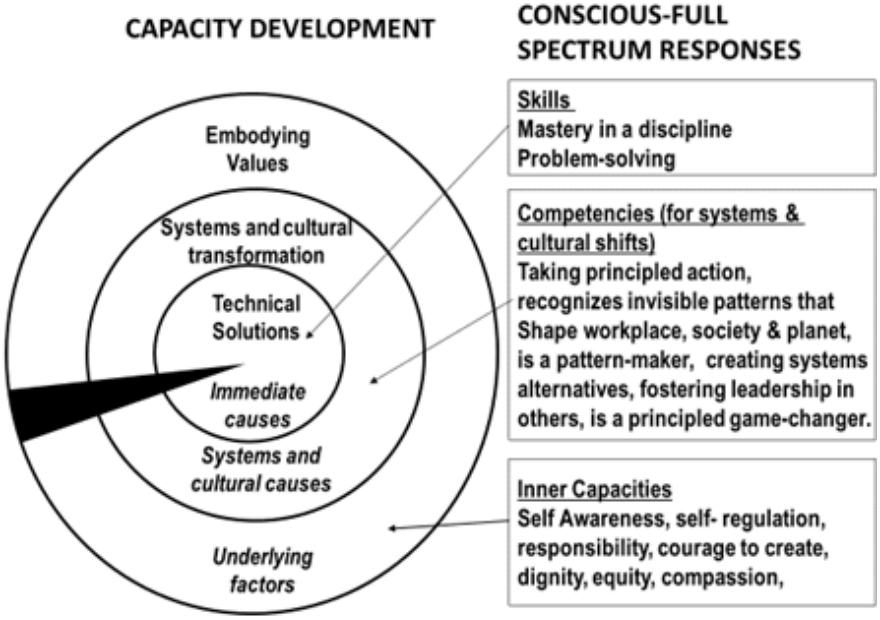

Figure 1: Capacity Development for sustainable results at scale.

DESIGN OF TEACHER TRAINING PROGRAM

In line with the principles above the target outcomes of this training program was:

Skills

Creation of projects through programming was one of the core skill areas of the program where teachers

themselves learned creating projects to addressing challenges.

Basic & Intermediate (for Mastery)

- Scratch Programming – Interactive queries (sensing), drawing different shapes (pen), animated stories (events, looks), maze game, blocks or functions in scratch, concentric circles with perimeters(variables), and mathematical concepts, pen (shapes, mandalas), fractions, coordinate geometry, graphs.
- Geogebra: Introduction, drawing shapes, midpoint, ratio of perimeter of circle to different polygons that fit in a circle.
- Using hardware for programming : Makey-Makey.

Expert (for exposure and for those who were already at intermediate level before the course)

- Scratch Programming - number line (integers subtraction), algebraic identities, square and cube roots (of large numbers), vernier callipers (explanation), nuclear fission (animation).
- Using hardware with Programming - Scratch: Finch robots, mindstorms, interactive camera, Snap for Arduino.
- Geogebra : Solar system, mandala, clock, interactive inputs, animation.
- Programming with Alice 3D - Introduction to a 3-D world, setting up a scene and props, customizing characters and animation.

Competencies

- Ability to listen deeply, reducing judgements and biases.
- To notice my own socialisation and not be limited by it.
- Recognize the invisible, multiple patterns and systems that shape societal and planetary situations and actions; recognize interdependence.
- Design and deliver on actions through CFSR, simultaneously in real time (1) source wisdom (2) shift systems and (3) solve problems.
- Enrolling partners through responsible speaking.
- Looking for commitment for action behind complaints.

Inner Capacity

- *Self-awareness*: What I stand for and my socialized fears. Courage is not the absence of fear, but my ability to transcend my socialized fears and act from my stand.
- *Self-regulation:*
  - o Distinguish one's wisdom (stand) from social, professional and personality identities (or profiles). Embrace all with respect for diversity (using wisdom profile).
  - o Noticing my Background conversation (based on socializations) and still myself for listening deeply to a person (or a child).
- *Courage to create:* Creative solutions with CFSR.
- *Responsibility*: Integrity lens noticing my wholess in being my word, looking for alignment in my work and my values - speak up and speak out, being the change, I wish to see - *embodying values*.

The participants of the training program were from Auroville, Pondicherry, Chennai, Gujarat, Mumbai and

Sittlingi. Most worked with NGOs working with marginalized communities including slum children, tribal children and rural children studying in government schools. The background of the participants was also diverse from teachers working on supplemental computer sessions to school management. One of the goals was to train people from around Auroville to allow them to start STEM centres in their own organizations. Each day of the workshop addressed each of the areas of skills, competencies and inner capacities and the plan for a typical day is shown below:

Day 2 - 03/05/19	
9.30 - 9.50	Sharing insight (what I learned about myself yesterday)
9.50 - 11.00	Noticing my Background conversation (based on socializations) and still myself for listening deeply to a person (or a child)
11.00 - 11.10	Thought Break – Walk, stop, clap, name
11.10 - 12.30	Scratch Programming continued: Drawing Shapes or Mandalas or Pythagoras theorem (depending on their plan)
12.30 - 1.30	Lunch
1.30 to 1.40	Inspirational videos: Isai Ambalam Video (10 min)
1.40 - 2.45	Scratch Programming continued: Projects on fractions/pie chart.
2.45 - 3.00	Break
3.00 - 4.25	Advanced Scratch Programming: Mindstorm using Scratch 3
4.25 - 4.30	Daily Reflection + Quotation of the day
Take home activity	1. Draw a mandala or any shapes using pen in Scratch 3 2. Using variables and random number show multiplication

Table 1

METHODOLOGY OF THE RESEARCH

The data for the research collected from the software program created for the course to track the progress of the participants. The software captured:

a) Survey data collected from feedback for the course at the end of the workshop. In the survey the participants conveyed what they felt they learned through the course under skills, competencies and inner capacities.
b) Daily learning and self-evaluation entered by participants that was used to record the learning each day as well as a repository of projects made by them to verify skills learned.
c) Insights shared in plenary each day as unlike skills, competencies and inner capacities expressed by participants are subjective and harder to verify. However, insights gave a sense of these and some are reported here.
d) Few notes based on communication/interaction with participants on what they have implemented after the workshop.

RESULTS

Skills

The survey on the skills (Fig 2) indicate that most participants felt that they had mastered many of the basic and intermediate programming outcomes.

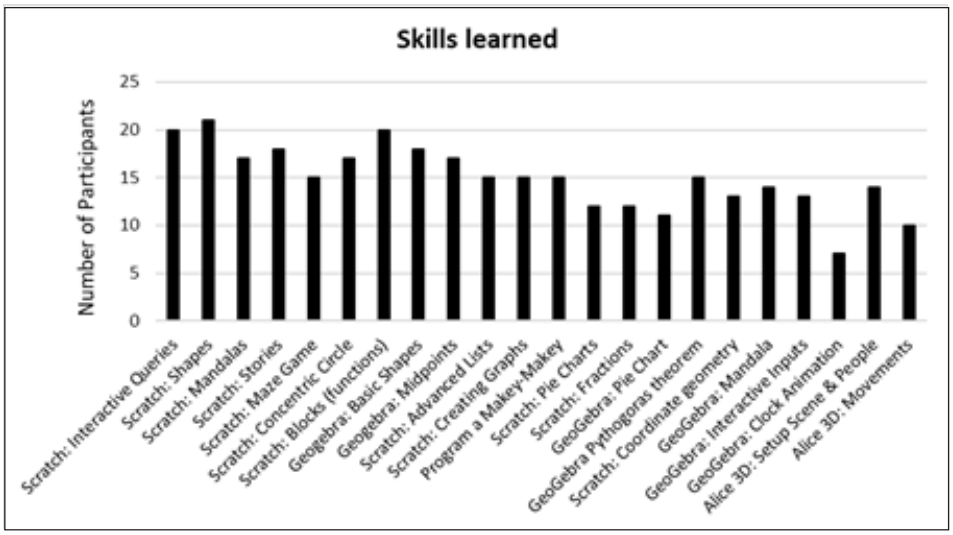

Figure 2: Skills vs the number of participants who felt they acquired them.

We stored all the projects made by participants and we saw that most had completed the challenges and made projects (outputs) requiring these skills. Within the 8 days 10 participants completed over 16 projects. The survey then reflects the confidence of the teachers in these skills (outcome). Many expressed their awareness of the expert topics we included for exposure. A few even took on the challenges of the expert skills and demonstrated these through their projects.

Competency

The survey results on the competency (Fig 3) indicated that they learned tools that would make them more effective to work with peers and management. They also started looking at solving problems in more than one way, listen deeply to others, being able to notice commitment for action behind complaints, give feedback and speak powerfully from values to enrol others. Many participants designed their CFSR directed at what they would do differently with the skills they acquired at the workshop to and shape learning back home. They also shared these projects linking their values and cultural shifts they hope to bring through them.

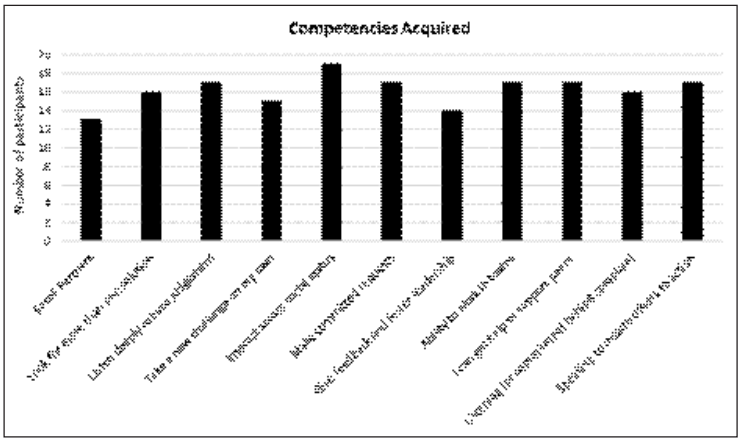

Figure 3: Competencies and number of participants who felt they had acquired them

Inner Capacities

The survey indicates on inner capacities (Figure 4) indicates that all participants became more self-aware and went beyond their socialized fears even in the duration of the course. Many initially found some of the aspects of the course hard and were able to persevere and learn it. Similarly, many were uncomfortable stepping in front of an audience and sharing their insights or projects at the beginning of the course but came forward to do so at the end of the course.

They were also able to notice their socializations especially cultural and how this impacts their perspectives. We noticed that with each exercise participants became more comfortable breaking their social and professional barriers for example teachers working with educators (school management).

Many of them noticed systems and cultures. They and were able to design beyond technical solutions using a CFSR that included system dimensions in their organizations or classrooms. They spoke in front of an audience and shared their designed breakthrough initiatives designed. They demonstrated the courage to create and seven of the participants who were not involved with programming before the workshop started using programming with children and/or set up STEM centres. Since the course **four new STEM** centres were started by the participants at Aikiyam school, Thamarai, Auroville Institute of Applied Technology and Auroville schools.

They took up responsibility and noticed when they were in and out of integrity.

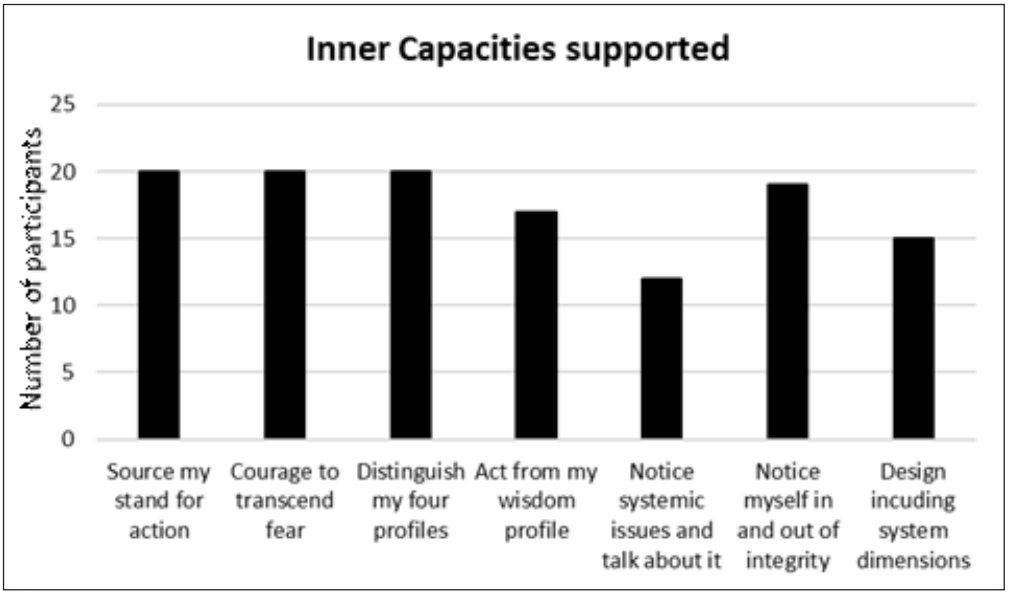

Figure 4: Inner capacities and the number of participants who believed they were able to exhibit it through the workshop

Some insights from participants

Unlike skills, competencies and inner capacities are harder to measure directly and we share some of the insights of participants to aid this:

'I will encourage myself and the children I work with to experiment freely and try new ideas without fear of failure.'

'If I think I know something and other person is conveying the same to me I won't even listen to them, but I now realized that when I listen deeply, I was able to learn new things which I did not know before.'

'I noticed that I am able to move beyond win-lose to win-learn' [Move beyond fear of failure]

'I learnt my four profiles (wisdom, social, professional, personality), especially social profile that I am more attached to and make me think deeply about it.' [I need to work beyond my social profile]

'I noticed that I expect society to be based on how I grew up.' [My current socializations]

'I learned to be authentic and not to try to impress people.'

'I was able to look at the problem differently and get a structure for the ideas on how to go about solving it.' [Conscious Full Spectrum Response vs a partial response]

'I realized that I do not need to stop when I get one answer and keep looking for more.' [look at many ways to solve a problem to support children's learning]

CONCLUSIONS

To support future leaders in children the teachers of today themselves need to be equipped with leadership capacity. A technical training program on programming for learning Mathematics was designed in line with capacity development to create sustainable and holistic results through a conscious full spectrum response (CFSR). A CSFR based capacity development simultaneously addresses immediate causes, systemic and cultural causes and underlying factors through skills, competencies and inner-capacities.

The skills, competencies and inner capacities targeted in this program were listed and analysed based on surveys at the end of the course, projects that participants created and in their reflections on each day.

We find that many participants felt they had acquired competencies and inner capacities along with skills in the program and this supports development and use of these skills creatively beyond what was already done at STEM land. This supports emergence rather than prescriptive design and implementation necessary for scaling. At the end of the program, the participants have demonstrated their courage to create and **seven** participants who were not involved in STEM earlier have started teaching programming and created four new STEM centres so far.

ACKNOWLEDGEMENTS

We thank our partners Aura Semiconductor Private Limited, Quit AI, Asha for Education, Udavi School, Isai Ambalam School, SDZ and SAIIER, S4NE and Dr. Monica Sharma for their continuous support to STEM land that made this research possible. We additionally thank individuals including Adya, Heidi, Bhuvana and reviewers who helped us make this paper more rigorous and understandable.

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