Mathematics, psychosocial work and human rights: a unique partnership between technical consultants and community organizers in India

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Best practice in psychosocial work with marginalized populations emphasizes the importance of community participatory approaches. However, the majority of field reports on psychosocial support with marginalized children describe donor initiated projects in which the goal is community empowerment, ownership and control, rather than reports about collaboration with activist movements arising from the communities themselves. This paper addresses one recent example of the latter form of collaboration, in which activists of a social movement in Tamil Nadu, India requested brief, targeted, external psychosocial assistance, following the tsunami of December 2004. The focus of the assistance, at the community's request, was to increase cognitive capacity among children and volunteer teachers in a community education program.

Keywords: *Dalit*, psychosocial, teaching action research method (TAR method)

The target group

Social exclusion of marginalized groups is ubiquitous around the world. Descendents of slaves (African Americans) in the United States of America, indigenous or First Peoples world wide, and the Roma in Europe are some Western examples (DFID, 2005). A traditionally marginalized segment of the population that continues in contemporary India is a group described, both culturally and politically, as *Dalit*.

According to Hindu tradition, persons are reborn multiple times during the course of history. Each person is born into a position in the social hierarchy, based on behaviour believed to have been exhibited during prior lives. Because the tradition holds that the origin of this hierarchy precedes birth, and can be altered after life, a person remains in the same position in the hierarchy throughout any given lifetime. During that lifetime opportunity is given to improve status in future lives. (Chattopadhyay, 2003; Human Rights Watch, 1999).

Traditional scholars (Chattopadhyay, 2003; Human Rights Watch, 1999) describe four traditional categories, called castes or *Varnas*, based on a level of 'ritual purity'. A fifth category is for those who are born without caste. Those without caste were originally called *untouchables*, because seeing or touching them was considered to 'pollute' those of other castes. For this reason, *untouchables* were expected to live on the edge of the community and to be seen only at night. Furthermore, they were expected not enter public places, except during night hours, in order to clean them. This status meant their children were excluded from schools entirely (Corrie, 1994). This fifth cast of *untouchables* was formally abolished by the Indian constitution during

its independence in 1948. Since then former *untouchables* have been known by various euphemisms. Gandhi called them the *'harijan'* or children of god, a term that many considered condescending. B.R. Ambedkar, another founder of the modern Indian state, coined the term *Dalit*, translated variously as 'broken' or 'oppressed.' (Chattopadhyay, 2003; Corrie, 1994).

However, neither official policy nor name change have produced a significant change in the way other people treat them. As with other socially marginalized groups around the world, affirmative action policies have so far been insufficient to address the severe economic and social inequality that the modern *Dalit* community suffers (Benedict, 2006; NCDHR, 2005).

Some *Dalit* have been able to gain complete social integration, and many contribute to the cultural and social life of the community on an equal footing. Another group has been successful economically, and has participated in the conscious engagement in political action to support the improvement of the community as a whole (Köhler, 2006). However, continuous poverty and hereditary debt continue to complicate the lives of the majority (Benedict, 2006; Chattopadhyay, 2003). While education is now free and compulsory throughout the country, this is only the second generation of *Dalit* children to have access to school, accounting for the extraordinarily low rate of literacy in an otherwise highly literate society (Benedict, 2006; Chattopadhyay, 2003).

The history of the project

In 2001, graduate student members of the Democratic Federation of Youth of India (DFYI) formed the activist group the Agents of Change (AOC). The group live and work in Tamil Nadu, India, among the *Dalit* communities. Their purpose is to break the cycle of caste based poverty among their marginalized *Dalit* neighbours, and to promote political and social transformation. It is an important source of pride, as well as a political principle, that AOC receive no external funding for their work.

In 2002, the AOC created the Pondicherry Science Forum and the Nagapattinam Science Forum, respectively. These institutions were designed to share scientific knowledge with their neighbours and to encourage its use in the service of community-directed sustainable development projects. In the course of this work, the AOC became aware that lack of literacy and poor understanding of elementary maths and sciences made work of the Science Forums difficult. A project of adult literacy was planned, but the participants stated that they would be more interested in supporting their children's education than their own.

Globally, educational outcomes for children from marginalized groups continue to be lower than those of children from majority backgrounds, regardless of where in the world they live (Ross & Genevois, 2004). However, for the *Dalit* in Tamil Nadu, educational outcomes are extremely low. One study done at the University of Madras cites a literacy rate of 31,48% for boys and 10.93% for girls as compared to an overall literacy rate of 73,4% (Muthumary, 2004).

In this project to address the literacy problems, parents agreed to take responsibility for providing space for the centres and sending the children regularly. Local DFYI members who had left school after 10th or 11th grade, volunteered to teach. By December 2004, the AOC had established 84 of these centres with over 250 volunteer teachers reaching more than 5000 students in Nagapattinam, Pondicherry and the environs.

The teachers had a strong desire to help their students. As *Dalit* community members, they created an atmosphere that was accepting and warm. Further, they provided a routine time and place for students to focus on their homework, and the company of supportive mentors. Educators suggest that this process may be helpful in itself (Vygotsky, 1935). However, one problem arose as a result of the teachers' own limited knowledge of mathematics, and this was credited with a low level of effectiveness in improving students' grades. An additional problem was that the volunteer teachers often replicated the top-down, ineffective teaching methods that had made their own education so difficult.

The serious discrepancy in educational outcomes for the *Dalit* community of Nagapattinam led the AOC to search for ways to improve the capacity of the volunteer teachers to educate the children in their care.[1] The AOC contacted the Teaching Action Research (TAR) team in New York. The members of this team were eager to share their knowledge and to learn about social transformation at the grass roots level from the Agents of Change.

After the tsunami: the need for a psychosocial intervention

The tsunami of 26 December 2004 devastated Tamil Nadu in general, and Nagapattinam in particular. According to the Indian Government, 6856 people were killed and 57 hamlets were destroyed entirely. The *Dalit* community was particularly hard-hit, because of their marginal status. They, along with the fishing families, lived at the edge of the communities and nearly all of their homes were destroyed. The community was displaced to temporary shelters where, according to the National Campaign on *Dalit* Human Rights (2005), their marginali-

zation from the rest of the population was often maintained.

AOC and DFYI mobilized to assist in the emergency efforts. Initially, they focussed on supporting the marginalized *Dalit* and the fishing families who had survived the tsunami to build temporary shelters and recover their livelihoods. They then attempted to reopen the after-school centres and return to their community development projects at the Science Forums. However, the population, emotionally and materially exhausted by the tsunami and its wake, was no longer able to participate at the previous level.

In the aftermath of the devastation, many families reverted to traditional coping mechanisms to survive. These included: forced early marriage of girls, removing children from educational opportunities so that they could participate in economic activity (often hazardous labour), and placement of those children they could not feed into orphanages. These practices initially decimated the ranks of teachers, organizers and pupils, as they were either direct victims of these practices, or forced to scramble for ways to avoid them.

During this period, the government of India targeted the formal health and education systems for training in psychosocial assistance. Psychosocial counsellors were trained to visit affected families and communities, regardless of caste or economic situation. It provided training manuals to the numerous NGOs (nongovernmental organizations) and INGOs (international nongovernmental organizations) that came to offer post tsunami assistance for care of those who appeared to have been emotionally harmed by the situation. NIMHANS (the government of India's mental health agency) also provided manuals to teachers on approaches to children in schools. In this way, the AOC

were alerted to psychosocial intervention as a way to lift the depression of dispirited families and communities.

One of the requests of the AOC to the TAR team when they first arrived was that for the team's second visit, they would be accompanied by a psychosocial specialist who would train some of the AOC leadership, and the teachers themselves, in the use of psychosocial methods that could be incorporated into the classroom. By this they hoped that the psychosocial intervention would help prevent erosion of participation by dispirited organizers, while at the same time the mathematics teaching intervention would create more effective classrooms.

The project

Taking a baseline. The TAR team used an adapted version of the Community Participatory Evaluation Tool for Psychosocial Programs (CPET) (Bragin, 2005a) to obtain some baseline data to discover the psychosocial and developmental effects of the tsunami, as this was the presumed reason for the need to include psychosocial intervention in the classroom. They visited a sample of the after-school programmes (one in each district), as well as parents, teachers and children. Children were not asked about the effects of the tsunami. Instead, they were given a mathematics test and the results were then shared with parents and the TAR team. Parents reported no post tsunami difference in their own behaviour, or that of their children. Their children continued to be generally obedient and well behaved, but continued to get poor grades and were unable to complete required assignments, especially in mathematics. The parents were clear on their sole wish for the project: improve the children's grades and help them to learn maths. The tsunami had produced a view on the part of the parents that occupations

such as fishing and subsistence farming were ephemeral and dangerous. They wanted every possible assistance to insure that their children could get the 'good jobs' that they knew to be available in nearby Bangalore to people who were good at mathematics, computation and computer science.

Since this was a project initiated by the parents and their organizers, it was critical that the parents' stated wishes were treated with respect and responded to directly. Furthermore, because of the ubiquity of post tsunami 'psychosocial' and mental health interventions[2], many of which were poorly understood by the population, it seemed imperative to relate any psychosocial intervention directly to the request to improve student performance. Further, to then attempt to make the psychosocial portion of this knowledge explicit, so that the community could include this information in their efforts at empowerment.

Connection to sustainable resources. The TAR team worked with AOC to obtain material support for some of the schools through a UNICEF education program, for a period of one year, so that they could restore their formal level of service and expand their activities among displaced and marginalized populations. This resulted in supplies being given to functioning night schools, and some workshops in Children's Rights being provided for the volunteer teachers.

Teaching action research intervention. Teaching Action Research is an outgrowth of the methodology of Paolo Freire (2006). This methodology suggests that top-down education to marginalized people creates an atmosphere in which they see themselves as passive recipients of knowledge, preventing them from taking the active role necessary to succeed. Freire advocates an approach of learning through active discovery. TAR uses Freire's discovery methods to teach mathematics.

Box 1: An example of the TAR method

A young woman working on fractions in a small group raises her hand. Instead of being asked for the answer to a question, she is asked to describe the method that she used to solve the problem. She carefully describes her method. The answer at the end is wrong. A group member wonders with her about the process of finding the answer, and suggests a different route. The young woman tries again, with the help of her colleague, and they reach the correct answer together! The teacher praises the group for discovering an effective path. The student now understands another way to think about the problem! No one has been shamed and the group can work together. The student has not only learned to solve a problem in fractions, but also how to get help from her community in finding pathways to solve complex problems

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The TAR mathematics method turns the classroom into a laboratory in which teachers learn about the learning styles and the needs of the people that they are teaching. Instead of seeing students who don't understand their teaching as dull, the teacher tries to follow the line of inquiry of these students. That way teacher and student are, together, able to discover the source of the misunderstanding and correct it (Figure 1).

The TAR team reached three groups of a total of 70 teacher/trainers, and 25 DFYI organizers in their methodology. They used discovery methods to introduce teaching and learning ideas. Their goal was to establish moments of understanding in the teachers, which they could replicate with the students. The trainers practiced in classrooms, with TAR team observers present, so that they could begin to train others in the coming months.

Teachers immediately began using the techniques in the night school classrooms, changing the atmosphere to a more positive one. Those who came from more educated (non *Dalit*) families were also able to retain and grasp the different approach to mathematical concepts, and to teach other teachers how to use the method.

However, among the *Dalit* teachers, the problem was more intractable. They enjoyed the more open classroom atmosphere, and replicated aspects of the methodology

such as keeping an equal and warm relationship with students with relative ease. However, they could not connect or retain the application well of the methods to the specific mathematics problems to be taught: fractions, signed numbers and algebraic thinking. These would, therefore, have to be repeated in the subsequent workshop.

The TAR team believed that this difficulty might have been due to the effects of social oppression on capacity to learn, and believed that supplementing TAR with psychosocial interventions might be the way forward (Czarnocha & Prabhu, 2004).

Adapting future plans. Given the results of the baseline interviews and the experience of the training of teachers, it seemed clear that the psychosocial consultant would need to focus on the way that social marginalization might affect teaching and learning. The idea would be to make knowledge explicit and help the teachers and the students to use that knowledge to overcome learning inhibitions. This seemed a 'tall order' for a 10-day consultation. However, the hope was that once a core group understood the principles involved, they could use readily available local knowledge to support ongoing work.

The psychosocial intervention

The psychosocial intervention included a training of 90 teachers and organizers in

psychosocial/developmental principles to use in the course of their work. In addition, 25 DFYI members were trained as trainers so that the intervention can be replicated as the programme expands. During the psychosocial training workshops, the following subjects were addressed:

- Experiential learning as a model for understanding psychosocial work
- Understanding social violence and how it interferes with learning
- Basic principles of cognitive, social and psychological development of children, and how to open up children's capacity to learn
- How social oppression is replicated in family life and how developmental methods in the classroom could address this
- Identifying and including positive community traditions in the classroom: why and how?
- Some techniques to help children bring their knowledge to the classroom
- Understanding community based monitoring and evaluation

Rationale. Learning is a lifelong process (Greenspan, 1997) that starts in infancy. Interaction with human caregivers expands neural networks, and increases the capacity to develop and understand relationships. After 18 months, young children develop a theory of mind[3] and by 3 years old are able to substitute symbols for actions. All of these are the building blocks of mathematical knowledge formulated not in the classroom but by practical and active experience in life, supported by relationships to the people that one loves. Therefore, poor children with 'good-enough' family lives come to school with adequate mental preparation to learn. Sometimes, the way in which the school addresses learning is so radically different from the way in which the child has learned at home that the process of learning simply cannot move forward.

Moreover, violence and threat may have had a detrimental effect on children's capacities for learning (Bragin, 2005a; 2005b). It may be that the nature of the school itself so terrifies these children that they are unable to make use of the mental preparation they have received to increase their knowledge and learn what schools have to teach. Contemporary research shows that children who are exposed to extreme violence information is not symbolized, but is stored differently, and not made available to the rest of the mind for processing. Further, the brain begins to produce cortisol, a chemical agent that stimulates hyper vigilance and diffuse attention, so that the child is no longer able to concentrate, as the brain is preparing the nervous system for possible fight or flight (Perry, 1997).

Experiential workshops. Before entering school, students from marginalized groups in developing countries have already learned many things. They have already learned to trade in the market, to look after small animals, to assist with the preparation of food, to tend the household, etc. However, because their parents are often illiterate, they are unfamiliar with books and the style of book learning promoted at school. Sometimes they also are told that the learning they have done since birth is not a form of learning and that the activities at school will be entirely new ones.

The young volunteer teachers had the same misconceptions and carried them over into their own teaching and learning. Therefore, the workshops had to call their assumptions into question as they began to learn. (See Box 2).

Box 2: Things you learned before you were five years old

Each of you think hard. All of you grew up here in this community?

Yes, we did

Can you name one thing that you learned before you were five years old?

We didn't learn. . .

I learned. . . my mom sent me to dance class

No one else learned?

No, we didn't (looking dejected)

How many girls helped Mom at home?

All. . . I see. . ..

What did you do?

Tending children, cooking, fetching water, going to the market

What skills did you learn to do these things?

No skills. . .

Well what things did you need to know to do these things?

Well maybe to count money and to balance water on our heads and to make a fire
    and how to stop a baby from crying. . .. And how to steer clear of drunks. . .

And did you always know these things, or did you learn them?

First a girl is a baby herself and then slowly by slowly her sister will show her some
    things, and then her mom, and then she begins to learn

*Aha . . . so you said learn. . . so you did learn. I wonder what other things you learned. . .. did anyone
    tell a story to quiet a baby? Sing a song?*

- Giggles from the girls. . .

Oh have I caught you learning something girls?

And the boys, what did you do?

Caring for the animals, and fishing

If I were to go out to fish today, how many would I catch?

Laughter from everyone

Why are you laughing at me?

Because madam. . .. It will not matter how many you catch. . .. You will die in the
    water. . .

Will I die because of the tsunami???

More laughter. No, because you will be lost at sea. . . first you must learn to read the sky
    and the earth so that you can find your way home!

The goals of the workshops were:

1. To have the teachers question their assumptions through experiential learning
2. To learn some things about psychosocial development through reflection of their own life-experience
3. To learn some good participatory learning techniques that they could use with children.

Life maps (see Box 3) were used to help participants to understand the meaning of the concept 'psychosocial' and apply it to their own

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Box 3: Life map exercise
1. Participants sit in groups of six and receive the following instructions:
Draw a map of your life, from the day you were born to this place today. Show the best and worst things that happened to you, and the most important people.
In your group, analyze each life map, and divide it into psychological and social effects. How do they affect each other?
2. All participants sit in a circle. Each group displays one map to the others
3. Participants sit in groups of six and receive the following instruction:
What are the psychosocial effects of poverty (low caste, etc.) on children's development?
Each group names some effects based on the maps, writes them on cards and brings them to the front of the room.

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lives. These same life maps helped the participants to focus on learning by age and stage of development, and how life's difficulties could enhance or interfere.

Plasticine was used to help participants to learn what symbol formation meant and to understand symbolic processes (see Box 4).

In addition, participants were asked to develop *lessons in mathematics, based on the life experiences of children.* They were asked to do the problem first in 'Natural Mathematics' (the traditional method that illiterate people in the region use to solve computational problems), and then translate them into lessons in maths.

Evaluation of the workshops. Three separate workshops were held for 95 teachers and organizers. All of the teachers included in this group continue to volunteer in the centres, enhancing their capacity by what they have learned.

After the workshop the teachers who had displayed great difficulty with teaching mathematics were also able to create exercises that started with what children had learned at home. They were able to create an informal set of lessons based on rural life to use with the children.

Discussion

Clearly, the greatest accomplishment of this programme was to support and sustain an ongoing grassroots effort. This effort is continuing and actually expanding at a time when internationally funded programmes are ending their commitment. Whatever capacity was built with this community remains within the community as these efforts continue. The value that the organizers place on imbedding their work of psychosocial concepts is realized in the continuing search for partners to increase their level of skill in this arena.

Box 4: Symbolic processes
Participants sit in groups of six and receive the following instructions:
1. *Think of something important to you and discuss it as a group.*
2. *After this, each person makes something out of plasticine to represent the idea. Talk about what you have made and how each object symbolizes the idea*
3. *Destroy the object. Now think of something that reminds you of that object.*
4. *Make that object out of clay. That is the symbolic equivalent. Letters and numbers are symbolic equivalents!*

The AOC today continue to operate 80 after-school centres among marginalized communities of Nagapattinam and Pondicherry in Tamil Nadu. The centres maintain an enrolment of 5000 children in total. Both of these numbers are about the same as those that were extant prior to the tsunami.

All of the centres operate on 'child friendly' and student centred learning principles. The children are also encouraged to play and to be active at the centres. Parents and elders have been invited into the centres to tell traditional stories and teach traditional computation skills

The AOC, DFYI and the volunteer teachers are all aware of that children's comfort and wellbeing is central to teaching and learning. The AOC and UNICEF were able to monitor the centres to insure that child friendly approaches were continuing. They did this through unannounced spot checks.

In this programme, as in many others, the sources of strength are the sources of weakness. Because the programme is entirely run by volunteers from within a poor and marginalized community, economic and social pressures on the members can make operations difficult. In particular, the AOC organizer most keenly involved in developing and strengthening the psychosocial programme left the country, responding to economic opportunities that would benefit his growing family. That left the remaining AOC to continue to maintain and supervise the program.

Because of this, no evaluation was carried out of the long-term effect of the workshops. Therefore, we do not know whether the methods employed with the teachers, or the theories behind them, helped the students to improve their school attendance or performance in the end.

Evaluation is considered empowering to communities (Bragin, 2005a; Psychosocial Working Group, 2003): it enables people to ensure that the interventions used for their benefit are actually beneficial to them, to discard ineffective practices, and to increase effective ones. The AOC had lost a key member and struggles to continue the programme in the face of their own economic, social and psychological difficulties. Faced with these difficulties, they felt that it was precisely the evaluation that they could afford to skip! The community members did not demand it either. This raised the question that perhaps it was only the consultants who wanted and needed a programme evaluation, being eager to learn if their methods worked and to produce significant scholarship, whereas the community members were uninterested. Is it possible that their previous experiences had taught them to fear evaluation, since only positive results were welcome by donors in the past?

During the course of work on this project the psychosocial consultant and the TAR team often questioned the advisability of outside advisors such as themselves being involved at all.[1] India, in general, and Tamil Nadu, in particular, are home to a number of important academic institutions, such as the University of Madras and the Tata Institute for Social Science, which can provide high quality support for local organizers and practitioners. Therefore it seemed clear that bringing in outsiders, even if requested, should be kept to a minimum since it could reflect an internalization of colonialism and the marginalization of local expertise. On the other hand, sometimes it is the outsider who is able to be helpful in a situation that has become intractable. In fact, the outsider may be needed to make the bridge to local expertise. This may be especially true, when outsiders are also outside of the local caste system, since the internalized oppression within that system, may prove difficult to

investigate in the presence of perceived members of the oppressor caste. Continuation of the visits by a psychosocial consultant would certainly reinforce the workshops, so that the participants could use what they learned to greater effect, supporting a gradual transfer of technical support to local institutions.

Conclusions

All around the world today, those engaged in psychosocial work struggle with the problem of how to help members of communities affected by social exclusion. One of the biggest issues to contend with is the way in which such exclusion has been replicated through educational institutions, affecting children's capacity to learn and to think properly. This in turn, affects the next generation's capacity to change the condition of the community as a whole. AOC has addressed the problem through the creation of its community night schools.

The teaching action research method in mathematics confronts this problem further through the creation of more effective methods for teaching mathematics. The programme described in this article[4] was meant to expand upon that work by adding information about psychosocial development and its effects on teaching and learning. This information is also built upon previous experience in working with children exposed to violence. By adding information about psychosocial development and its effects on teaching and learning, and by teaching some specifically child friendly interventions, the TAR team and psychosocial consultant hoped to help the community organizers to improve the capacity of thinking and learning among the children, parents and teachers with whom they worked.

Experience indicates that a developmental approach can counteract the effects of internalized violence on both the competence of

teachers and the children's capacity to learn (Perry, 1997; Bragin, 2005a). Community based monitoring and evaluation would indicate more clearly whether the interventions were, in fact, effective in the case of Nagapattinam and Pondicherry. Unfortunately, monitoring and evaluation proved too cumbersome for the organizers to manage under the stressful conditions of community organization, so that precise statistics are not available regarding the actual success of the project in improving children's academic performance.

However, the night schools of the AOC, once endangered by psychosocial stressors resulting from the tsunami, do continue to flourish, and to provide educational support, as well as a safe haven for a growing number *Dalit* children in Nagappattinam and Pondicherry. The brief consultation period is over, and the community teachers and organizers continue to use their enhanced skills to benefit their own communities.

Collaborations such as this one, with community organizations working for social change, can be both fruitful and important. They are the one way to ensure sustainability of community based psychosocial work.

Those who want to do this work should take time and care to insure that the participants understand precisely the relevance of the psychosocial ideas and concepts in relation to their own goals. The psychosocial workers must also show flexibility in their own definitions of their role, and be willing to bow to the leadership of the members of the community.

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[1] In December 2004, Professors Vrunda Prabhu and Bronislaw Czarnocha, from the City University of New York presented a paper, 'Teaching-Research and the Design Experiment— Two methodologies for integrating research and

classroom practice' at a conference at the Homi Bhabha Science Education Centre in Tamil Nadu on the teaching of science and mathematics. The work of the two professors was based on the popular education techniques of Paolo Friere (1970). They began by applying these techniques to advanced mathematics education for students from marginalized backgrounds. At the heart of the program was the alteration of power relations in the classroom, turning it into a zone of open inquiry, in which teacher and student collaborate to begin to understand mathematical concepts at greater and greater levels of abstraction. Research is used to help the students and teachers understand the meaning of mistakes and seek co-constructed levels of understanding.

One of the AOC members heard the lecture and inquired how the teaching-research methodology could be adapted to improve the quality of mathematics teaching and learning at the after-school centres.

The AOC contacted the professors in the hope of developing a collaboration in better quality teaching and learning in mathematics for the after-school centres. The professors, to be known here as the Teaching Action Research Team (TAR team), were eager to share their knowledge and to learn about social transformation at the grass roots level from the Agents of Change.

For that reason, the psychosocial advisor visited only once, training trainers of teachers, and the AOC leadership. The psychosocial advisor also trained TAR team on psychosocial issues in education, and participatory learning methodologies, in several intensive workshops prior to the visits.

[2] After the tsunami, the government of India had provided specialized psychosocial care to children living in shelter through various NGOs and INGOS. This care was delivered in the form of individual and group counselling as well as supervised play activities at the shelters. Skilled practitioners from around the world had been asked to participate.

[3] The beginning of an understanding that they have thoughts that they use to control their actions, and that other people also have thoughts which may not be the same as theirs.

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