



YOUNG SCIENTIFIC EXPLORERS

A Pilot Project

The Completion Report

"Imagination is more important than knowledge."
- Albert Einstein

Completion Report for
YOUNG SCIENTIFIC EXPLORERS:
Pilot Project
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1) Introduction

Young Scientific Explorers was a project designed to encourage and nurture the creative mind of young students using science. The inquisitive mind is unlocked to new ideas *via* learning science in a more “fun” way in order to help them develop an interest in the subject so as to reflect on everyday surroundings and happenings from a different and inquisitive perspective. The pilot project was targeted towards standard 5 students by exposing them to simple and practical approaches to tackling science related problems.

The project implementation was divided into two phases. In the first phase, adequately trained facilitators visited Tamil primary schools and exhibited eight interesting yet simple experiments. In phase two, they were brought to the National Science Centre in Bukit Kiara to illustrate and explain 25 pre-chosen exhibits.

➤ Aim

- To introduce science to the young in a ‘fun’ way to help them develop a love for the subject and be creative in their learning and applying of science in their everyday surroundings.

➤ Objectives

- To conduct simple, yet interesting experiments for Standard 5 students at 10 Tamil schools; a total of 8-10 different experiments would be conducted in each school.
- To bring all the participating students to the National Science Centre once and to elaborate to them at least 25 pre-chosen exhibits.
- To disseminate the findings to all Tamil schools and emphasize the importance of ‘hands-on’ experience in learning, especially for the young.

2) The Content Development

The project began with the setting up of the main committee to design and develop the project. The initial project team was divided into 2 groups, the content development team and the operational team.

The Content Development Team - The content development team was in charge of choosing and designing the experiments in the schools and the exhibits to be visited at the science centre. The experiments were gathered from various sources such as science books (for kids), the internet (found using internet search engines such as ‘google’ and ‘yahoo’) and interviewing relevant people. About 100 experiments were found using the

above mentioned methods, of which, 20 experiments were chosen for the project. The experiments were vetted using the following criterion, *i.e.* the chosen were:

- Experiments which were adequately simple and easy to understand.
- Experiments that could be conducted using everyday items.
- Experiments which were not potentially dangerous (*e.g.* no sharp objects or potentially toxic chemicals *etc.*).
- Experiments which took less than 10 minutes to prepare and perform.
- An exception to the above criteria was the Volcano experiment which was chosen to mark the end of the session, and thus needed to be more impressive to exhibit.

Of the 20 chosen experiments, 17 were translated into Tamil and assembled to form a booklet to be given to the participating students. Each illustrated experiment also had a section explaining the scientific principles behind the experiment. From these 17 experiments, 8 were chosen to be demonstrated to the students which are as follows:

- 1: BUILD A REAL WORKING VOLCANO
- 2: EGG-NEITHER FLOATS NOR DROWNS!
- 3: BALANCING ACT
- 4: TOO MUCH PRESSURE
- 5: SCIENCE FRICTION
- 6: WEIGHTY MYSTERY
- 7: HOT SIPS
- 8: NOT-SO-THIN AIR TRICK

The science centre was visited and investigated several times to choose the exhibits to be shown to the participating kids. The exhibits were chosen due to their simplicity in concepts, their effects in gaining the attention and wonderment of the kids and their location for logistics purposes. Also exhibits were chosen in specific different location in the centre so that the participants would be able to walk through most of the centre and all the sub-sections within it. A facilitator guide was prepared to help them identify and explain the various exhibits.

The Operational Team – The operational team was formed to help design the implementation model for the project. The team started by listing down the name of potential schools to participate. The schools were all located in the Klang valley in order to simplify the logistics issues related to the pilot project. The team then designed the letter addressed to the headmaster detailing the project and in order to obtain the schools participation and the approval from the school's Teacher-Parent Association. To ensure the commitment of the participating schools, the foundation decided to heavily subsidise, but not absorb the full cost of the project. There were different degrees of difficulties faced to obtain support for the project from the various schools but most were supportive once the project was properly explained. Then a colorful pamphlet was designed and produced to be sent to potential funders. The fund raising exercise proved to be successful since adequate funds were raised in the designated time.

3) The Training of Volunteers

About 12 experiments were tested by the content development team over 2 weekends in order to study the effectiveness and workability of the experiment. From these 12 experiments 8 were chosen for the ease of demonstrations to students by facilitators. A facilitator mentoring guide was also designed and written for volunteers. Finally the training of facilitators and volunteers were conducted on a Sunday. The day was divided into 2 sessions, the morning and afternoon session.

The Morning session – This session was conducted at the foundation’s office. It was further divided into 2 sections. In the first section, the facilitators were introduced to the project followed by a talk on how to deal with school children, *i.e.* how to be a good mentor/role model. The mentoring guide was used as a basis for this training. Then an invited speaker, a child physiologist spoke on child physiological development. She outlined that there are 2 types of IQs, the visual IQs and the verbal IQs. She noticed that Indian young people are very outstanding in Visual IQs, where the students are able to pick up things fast by observing things. She also outlined that kids crave for attention and thus it is always important to keep eye contact and to make the experience a ‘personal’ one, by compliments, focus, remembering the child names, *etc.*

During the second section, the facilitators were trained on the actual experiments. All 8 experiments were conducted by selected facilitators. Due to the lack of time, not all facilitators/volunteers conducted all the experiments instead they all took turns on different experiments. However, the experiment was conducted in an interactive manner to maximise the understanding.

The Afternoon session – After lunch, during the afternoon session, the facilitators were taken to the Science Centre. The trip was done using 4 different transports and was delayed as some found it hard to locate the centre. Thus logistics was an important consideration during this and following visits. At the centre, the facilitators were shown the different exhibits and some of them were explained in some detail. However, not all the experiment were explained in detail due to time constraints. However they were adequately explained in the facilitators kit for the science centre. This document was only given to facilitators and not to the participating kids.

4) The Implementation

The participating schools were - 9 Tamil Schools in Klang Valley. Those schools were SJK (T) Sentul, SJK (T) RRI, Sg. Buloh, SJK (T) Vivekananda, SJK (T) Appar, SJK (T) Thamboosamy, SJK (T) Cheras, SJK (T) Seaport, SJK (T) Kg. Pandan and SJK (T) San Peng. SJK (T) St. Joseph pulled out from the project due to other commitments.

The Participants - around 40 standard 5 students from each school, supervised by about 2 teachers.

The Volunteers/facilitators – about 14 volunteers participated in this project. They were taught about the experiments, and how to handle the students. Many of them were not present during the earlier group training session and were trained individually. Volunteers after some experience knew and understood the needs to engage the students on a personal level and recognizing the need of the participating students. Most of the facilitators were fresh graduates or University students although most of them were not of the science background. The facilitators were given a minimal stipend of RM30 per visit.

Phase 1 – The Experiments

The facilitators visited the schools and demonstrated a total of 8 experiments as detailed before. The students were also given copies of the Tamil translated experiment booklet with 17 experiments. The experiments were set up in different location in the room. Then, the students were divided into sub-groups *i.e.* small groups of not more than 10 students, to encourage greater participation and interaction with the students. Each group was shown the experiments in different order. The booklet which was given to the students at the beginning of the event contained relevant information to be used as a follow-up document or activity booklet by the teachers or the students themselves to explore more about science. Students were quizzed on matters related to science and technology at the end of the visit. The students were given button badges as a souvenir as a reminder of the event in hopes that they will continuously explore science in a novel manner. The participants were also asked for their feedback.

The budget to implement the event at each school was approximately RM600, of which RM 200 was borne by the participating school. This does not include the developmental costs and the cost incurred for the staff at the Tamil foundation.

Phase II – The Visit to the Science Centre

The students were escorted to the National Science Centre by about 4 facilitators and 2 teachers and showed the identified 25 key exhibits, which would be relevant in accordance with the student age, syllabus, ability and interest. It was hoped that the identified exhibits, would spark an interest in science among the young children. The facilitators explained the significance of the concepts behind each selected exhibits. The participants were asked to give a feedback on the event.

5) The Post-mortem

After the completion of the pilot-project the feedback from the visits were analysed followed by a brainstorming session, held at the Tamil Foundation office to further improve the project, and the following were concluded:

- Most of the students were inspired and took part actively in the experiments and the science centre visit. The teachers were generally supportive to the organizer and the facilitators. Some teachers requested the Tamil Foundation to organize the

- event on a yearly basis. The schools were satisfied with the facilitators' performance and they co-operated in making the project a success.
- There were some problems and difficulties faced during this project. The facilitators faced transport problems to get to the school on time. Some facilitators were dependent on other parties to get a lift to the school. Also some found it difficult to locate the school. Some volunteers were not used to a project based on scientific experiments due to their non-scientific background.
 - Facilitators also noticed insufficient materials for the experiments during the implementation of the project. Certain experiments utilised the same materials such as the ruler, flour, and cups which were not sufficient during the visit.
 - In a few schools [SJK (T) Seaport, SJK (T) Cheras], students' responses were not very good. They did not pay sufficient attention while the facilitators were conducting and explaining the experiments. These were also schools which were located in the most disadvantaged areas.

The post-mortem team then conducted a Strength, Weakness, Opportunity and Threat analysis of the project. The results are as follows below

<p style="text-align: center;">Strength</p> <ul style="list-style-type: none"> -The volunteers -Good existing networks -Adequate training -Suitable for students -Most teachers cooperated -Students were enthusiastic -Support of National Science Centre(NSC) -Adequate funding -A base office for the project (TF) -Respect by teachers and students -Adequate Food and badge -Adequate science material -Bus drivers co-operative 	<p style="text-align: center;">Weakness</p> <ul style="list-style-type: none"> -Some volunteers were passive -Some trained volunteers dropped out -Some experiment's materials inadequate -Some teachers not co-operative -Printing & Factual errors in booklet -Guide for volunteers was not ready- Volunteers could not find the exhibits -Punctuality problem -Some administrative hiccups -Communication problem -Insufficient reminders of the visit -Logistics problem Materials not compact
<p style="text-align: center;">Opportunity</p> <ul style="list-style-type: none"> Exposure & 'Income' for volunteers Tamil Foundation gets new volunteers Kids visit new place / see live experiments – very interactive Encourage kids be inquisitive Relatively good booklet EWRf expresses interest (outside party) Some kids inspired & create interest Easier way to learn science Expose new method of teaching Volunteers reputation / co-operation with school Better result in schools 	<p style="text-align: center;">Threat</p> <ul style="list-style-type: none"> Parents worried- not informed earlier Transport problem Communication Planning [Tamil Foundation → Teachers, Teachers → Parents, Teachers → Students, Teachers → Tamil Foundation] Not enough adequate volunteers Volunteers recruitment and retention Outside organisation getting our workers Not enough workers (administration) The main ally at the NSC to retire

The following strategies are to be undertaken:

- Provide adequate map/transport/guideline/guidance for the facilitators depending on individual needs.
- List out and purchase the materials for the experiments well in advance and arrange the materials into small boxes (a mobile experiment kit).
- Provide adequate guidelines for the teachers, to ensure teachers play an active role in the event. Possibly visit the schools earlier to introduce the project and the facilitators to the schools administration.
- Request for teachers who are capable with knowledge in particular subject, *i.e.* science teachers. (*e.g.* during the visit to the Science Centre, the science teachers from the school should come along with the students so they can follow up later)

5 key Area to be Improved and Action identified

1) *Improve guidebook or booklet*

- Factual check, translation & English
- Improve look & feel
- Prepare better map & pathway (pictorial)
- Send completed improve copies to relevant people

2) *Communication*

- Briefing to the teachers –invite 2 person from each school for discussion
- Prepare video (audio visual) on the project
- Prepare Project agenda (photos-briefing)
- Organise Appreciation event for the school/ teachers (certificate, souvenir)
- Invite teachers to a thank you dinner/lunch
- Send result of the pilot project to other schools

3) *Volunteers*

- Change name to ‘facilitator’
- Transport problem (maybe buy van) – added publicity value
- Clash with work – more facilitators
- Design Training on how to deal with teachers and kids
- Prepare and design Attire for volunteers
- Recruitment – advertise in media
- Training – improved & longer (Science experiment, communication, psychological, NSC), maybe 3 day intensive camp – training

4) *Facilities*

- Prepare compact kit for volunteers
- Regular check of the kit (checklist) –to file
- Design T-shirt, cap *etc.*
- Provide notebooks + pen

- Organise Essay competition (NSC visit / experiment)
- Prepare checklist per volunteers on the day

5) *Science Centre*

- Transport → Arrange early
 - More committed driver
 - Prepare direction (map) to NSC and the exhibits
 - Punctuality
 - Improve Logistics – distance, time, traffic
- Fee (further subsidy) – meet potential funders.
- Explore further teachers involvement
- Continuous reviews of exhibits (spoil, change, replace)

6) **The Appreciation Event**

An appreciation event was held at the Royal Selangor Club to appreciate the support shown by the facilitators and the teachers. Certificates were awarded to the facilitators and the participating schools followed by lunch. A feedback session was also held.

The general views from the facilitators/Volunteers were;

- The event was a good personal experience
- It also allowed the facilitators to get to know the real situation of the Tamil Schools in Malaysia.
- There is a need to improve the relationship between teachers, parents, students and the foundation.
- The time for the event was limited; there was a need to rush.
- Students were interested and they asked a lot of questions, some were difficult to answer.
- Some schools' responses are good while some are not. Need to have good rapport with schools.
- Need to concentrate more on schools where the education level is low *i.e.* less advantaged students/areas.
- More projects about and using computers should be included in the Foundation future programs.
- Time management is very important from all quarters.
- The booklet should be in simple language.
- A need for an intensive training camp for facilitators/volunteers.
- Teachers should follow up with an essay competition about the project for the students.

The general views of the teachers were;

- An improvement in the student's attitude towards Science subjects, after the visit was observed, but need to be maintained.
- Suggested follow up activities such as science competition among the students

- Teachers are too busy and under pressure to prepare the students for exams. So, the foundation needs to continue this type of effort.
- Should invite the entire Tamil school science teachers and organise a dialogue session.
- In future, invite science teachers to join the project planning team.
- Provide booklet and material earlier to the schools so the teachers may prepare the students for the event.
- Some students found the experiments to common, *i.e.* they have seen it before. This depends on the science teacher who may have shown some of it to the students. Most of these students are also from an educated family.
- The teachers should also be trained to undertake follow up, since some schools do not have science teachers.

Conclusion

The project was completed as planned. All the deliverables were met by the project team with various degrees of quality. Even though there were some problems faced by organization, schools and volunteers, the project achieved its aim and objectives. The project was also replicated in 3 other schools by volunteers outside the Klang valley. However there is a need to improve the project and share the information and conclusions with other schools and organizations for replication.

Note: Eight Appendix' to this report were removed for ease of reading. They are available from the ASTI office on request.