



INTRODUCTION AND RATIONALE

Hands On Technologies is already involved in an Early Childhood Development Project entitled "Developing Talents Through Creative Play". It is based on the belief that children learn well through creative or constructive play. We believe that learning is more effective when learners are actively involved in the learning process. Learners learn best when they construct something that they find personally meaningful. We are already seeing the benefits of this project in over 15 schools in Atteridgeville.

However, we now have some learners who leave these primary schools with a heightened awareness, ability and interest in maths, science and technology, and we do not yet have a way to harness and develop this potential. We really would like to be able to provide them with a platform to continue their development and build on their new talents. We want to encourage girls in particular, but work with all learners who demonstrate an interest or ability. We plan to work with these learners throughout their high school years and better prepare them for tertiary education.

The township high schools do not have many extra-mural activities for these learners or opportunities for them to pursue these new interests. It is during these years that learners, particularly girls, fall prey to less positive influences and even though they have ability, many often do not complete their schooling or go on to demonstrate their true potential.

Herein lies the basis for our new project,

"Promoting Engineering Through Robotics".

As technology becomes increasingly more important in the world today, it is critical that the youth not only learn how to use technology, but also understand how to create it. Robotics provides us with a perfect solution. Robotics introduces young students to engineering and motivates them to be involved in creating future technology. In addition, robotics allows young students to develop invaluable skills such as problem-solving, logical reasoning, critical thinking and creativity.

Robotics is seen as an exciting learning area around the world at the moment, and in South Africa we have two main robotic competitions that we want to get young black learners involved in. Currently, both FIRST LEGO League (FLL) and World Robot Olympiad (WRO) have hardly any black teams participating, and none have ever represented South Africa at a World Championship. The intention of this project is to dramatically change this. Over thirty teams a year will be trained, prepared and entered into these competitions. We also plan to continue working with these learners, to track their progress during high school and to ensure they continue with maths and science.

Our proposal is for an innovative, unconventional robotics pilot that could not only serve, but also protect township learners. The idea of making technology hip and taking technology to the learners is interesting in that we use students from the community to visit and train the learners in the community. One of the real innovative and exciting ideas is the backpack idea – allowing us to keep the technology safe and working – but also giving us the flexibility to train anywhere.

We really hope that through an intervention like this, we will be able to show that we can assist more young black learners to enter the fields of science and engineering.

PROJECT BRIEF

Year 1

Candidates

Identify 100 to 200 township learners with Maths, Science or Technology potential.

- top achievers from *Developing Talents Through Creative Play Project* schools from 2009 - 2011.
- plus recommendations from local High Schools.

Training Facilities

We plan to set up 2 permanent Training Facilities

- 1 - at the Tshwane University of Technology - in the Mechatronics Department (Dept. of Engineering).
- 2 - at Lemoshanang - the Teacher Centre in Atteridgeville (very central location in the township).

We plan to setup a few **Satellite Venues**

To start with, these will be at some of the *Developing Talents Through Creative Play Project* schools.

Advantages are : they can be moved easily and the intention is to make it easy for the learners to attend.

We plan to set up a number of **Mobile Units**

Many projects run into difficulties when the computers they place in the townships have problems.

Our intention is to pack 5 notebooks into a backpack - allowing trainers to check and update all the computers on a weekly basis and ensure that they always have working computers for the training.

We have already designed and built a stainless steel **Mobile Competition Trailer**

Includes competition tables, kits, laptops, power - can be used for training or to host a competition.

Can be towed by any car with a tow bar - can go anywhere in SA

The LEGO Foundation has already agreed to contribute towards the project kits required - if the project goes ahead.

Coaches / Mentors / Trainers

Initially, we would like to train about 25 trainers / mentors so that we have extras if needed.

We have already identified 2 institutions who have already started working with us :

TUT - university mechanical, engineering and robotics students (under the supervision of a lecturer)

- will run and train at the new Training Centre setup at the University Campus (Pretoria)
- will also travel into the township and train at the teacher centre / satellite / mobile units

UNISA - a team of lecturers who would like to be involved with coaching and training the trainers

- will also supply some students to travel into the township and train at the satellite / mobile units
- can provide venues for regional and national competitions (WRO and FLL)

Training Sessions

Trainers (students) will receive a stipend for the Robotics Training sessions they do.

They will also receive a contribution for travelling expenses if they have to travel.

There will be funding to assist the transportation of some learners to the centre at TUT. (Comp Training)

We plan to run the following program at each of the venues :

- 10 to 20 learners per session per venue = ± 100 to 200 learners per week
- learners will start with a 6 week **Intro to Robotics I** course.
- they will then work in teams of 2 or 3 and do a 4 week course to prepare them for their first WRO competition.
- after the competition and a short break, learners will complete another 6 week **Intro to Robotics II** course.
- if some of the learners prove to be ready, they will be encouraged to participate in another competition - FLL.

We hope to encourage 6 - 12 township teachers to join the learners for the training.

The long term intention is to train and then use these teachers as trainers and mentors in the future.

Township Competitions

We plan to run a robotic competition in the township once every term. All learners participating in the new project will be eligible to enter. This will be done on a Saturday morning at one of the schools, and used to showcase Robotics and to generate more interest and support for the project. The Dept. of Education has agreed to assist.

We also plan to run these competitions in conjunction with the technology competitions we run for our other project.

Learners in our project schools must want and aim to be selected for this *Promoting Engineering Through Robotics Project* in the future.

Project Manager

We plan to employ a part time project manager to oversee this "Robotics" project.

PROJECT BRIEF

Year 2

Candidates

Continue to work with all the learners from Year 1.

Ultimate goal is to work with them for at least 3 - 5 years - then track their Matric results and further progress.

Identify a further 100 - 200 township learners with Maths, Science or Technology potential.

Training facilities

Continue with all the training facilities :

- there should be little need for any new or extra equipment.
- perhaps add to the number of mobile units if they prove successful

Coaches / Mentors / Trainers

Train the teachers from year 1 and \pm 25 new trainers / mentors.

Try double the number of trainers so that we can attempt to double the number of learners.

Continue to work with academic institutions - ZAZIDA & TUT & UNISA

Training Sessions

Trainers will continue to receive a stipend and travel expenses for the Robotics Training they do.

We plan to run double the training sessions per week at each of the 4 venues

- new learners will do the 12 week initial course and enter the WRO competition
- Year 1 learners will progress onto more advanced robotics and enter the WRO competition at a higher level.
- if any learners prove to be ready, they will also be encouraged to participate in the FLL competition

We aim to get more teams to do well and hopefully represent SA at either the WRO or FLL World Finals.

We hope to encourage more teachers to join the learners for the training and become trainers / mentors.

Township Competitions

We plan to continue and grow the robotic competitions in the township once every term.

Project Manager

It would be great if the position could evolve and become a full time position.

Year 3 onwards

Continue to identify and train more and more learners with Maths, Science or Technology potential coming out of the *Developing Talents Through Creative Play Project*.

Continue with and increase the amount of training done at the various Training Facilities.

Continue with and increase the training of coaches and mentors for the project.

Grow the township competitions - so that one eventually becomes a regional WRO competition.

Have a number of township teams doing well in the WRO and FLL and going on to represent SA.

In 2015 South Africa would like to host the World Robot Olympiad.