# Capacity development in Ecological Sanitation at Chisungu school in Zimbabwe

***This paper explains how pupils are educated about practical recycling, water supplies, hygiene, well and toilet construction.***

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## Abstract

During a 3 year project supported by the EcoSanRes project of Stockholm Environment Institute, Sweden, selected pupils at Chisungu Primary school, Epworth Zimbabwe, were taught the principles of ecological sanitation, with practical recycling activities involving the growth of vegetables, maize, and trees in orchards and woodlots. In additions the pupils were taught how to build a range of toilets, hand washing devices and even upgraded family wells. Both boys and girls participated in the various projects. The girls were particularly keen to show that they could develop the same skills as boys during all the activities. In Zimbabwe, the Blair Ventilated Improve Pit (VIP) toilet is the national standard sanitation system supported by the government for use in the rural and many peri-urban settlements. The existing standard for schools is a multi-compartment unit. This work revealed that single Blair VIP units could also be put to use in a very economical and practical way in schools and that the pupils, during extra-curricular activities, could participate in parts of the construction. In later work, the construction of these easily to build units was modified to make pit emptying easier and the safe recycling of the pit contents possible. The work has been described in an e-book entitled Teaching Ecological Sanitation in Schools.


## Introduction

In Zimbabwe, the Blair VIP toilet is the national standard sanitation system supported by the government for use in the rural and many peri-urban settlements, both in schools and individual homesteads. The Zimbabwe school curriculum includes details of the design and functioning of the Blair VIP toilet, which is used widely throughout the country. Most school children are aware of the name, the design and how the toilet works. However the promotion of pupil involvement in toilet construction has very seldom been put into practice in the school environment. However there are practical benefits to be gained in teaching the skills of brick and cement work, particularly in the rural and peri-urban settlements of Zimbabwe, and the Blair VIP offers an excellent model on which to learn these skills. The current standard practice in Zimbabwe is for the school to hire (often with donor support) artisans to build multi-compartment units consisting of between 5 and 10 cubicles. Tens of thousands of these units are in regular use throughout Zimbabwe. However this design is complex and not suitable as a model for pupils to practice their skills at brick construction.

In order to make a Blair VIP cheaper and easier to build in the school environment, refinements in the method of construction were used on the single unit which is

## Key findings and outcomes:

Far reaching long term benefits resulted from this study. These can be listed briefly as follow:

- New lower cost and easier to construct designs of Blair VIP developed
- New lower cost and simpler designs of Upgraded Family Wells developed
- Researched concepts of upgradeable series of both BVIP and UFW's
- New hand washing devices developed
- Demonstration of effects of diluted urine on green vegetables, maize and various trees
- Pit emptying and recycling methods developed
- Practical construction methods taught for brick, concrete and wood.
- Research into the "Girl Child" in relation to sanitation and menstrual hygiene management
- Above all revealed that all these methods and more can be taught within the school environment.

used at household level. This work revealed that single units could also be put to use in a very economical and practical way in the school environment and that the pupils, during extra –curricular activities, could even participate in parts of the construction. These skills, together with methods of recycling wastes and improved hygiene were also taught to the selected pupils. This very practical approaches to learn new skills in a "hands on" and practical way served as good models for capacity development within the school environment. Both for pupils and teachers. Even those pupils who were not directly involved showed great interest and the parents and members of the community kept a close eye on developments. School open days were popular.

## Early work

The process of practical instruction started in the class room with lectures and demonstrations concerning hygiene, hand washing and the various ecological toilets that could be built. These included the *Arborloo*, the *Fossa alterna* and the principles of urine diversion toilets. The topics also included the methods of using processed excreta to enhance the growth of food and trees. In practice the out-door program started on two fronts – the first of building simple toilets and the second on demonstration the effect of diluted urine on the growth of vegetables and maize.

## The series of toilet constructions

At first the simplest toilets were built like the *Arborloo*, which consisted of constructing a concrete slab, a brick ring beam (inside which a shallow pit was dug) and a simple grass superstructure. A similar *Fossa alterna* was also built. From this point the students focussed on the construction of brick built Blair VIP toilets. Early constructions included lining the pit using a corbelling technique, making slabs and constructing small but effective spiral shaped (door-less) superstructures in brick. The roofs fitted with made from various materials. From this point full sized Blair VIP toilets were built, with particular attention being paid to the superstructure. The deeper pits lined with corbelled bricks could have been built by students, but it was decided to hire an artisan to line these deeper 2m deep corbelled pits. Slabs, superstructures and roofs of various types could be made by the students.

Observations made on students at work revealed that longer straight walls used on larger square spiral toilets could not be easily built by the students and the method focussed on a snail shaped spiral form. The snail type of construction has immense strength due to its shape, a reason for its use in nature. Walls which are not perfectly built will remain erect, simply because of their shape. The spiral construction was aided considerably by the use of two wooden templates which served as guides for constructing the spiral superstructure. These served as guides and were placed at each end of the spiral brick structure. When the structure was complete, the templates were removed. Roofs made of corrugated iron on a wooden frame and cement filled hessian were also used. The girls were particularly anxious to build a toilet by themselves, and with the various techniques developed during the project were able to do so with pride and satisfaction. The girl students, of their own accord, used some cement plaster to make a plaque on the wall of their toilet with their named scribed on to it – a lasting testament to their activities. The students also participated in extra-curricular activity based on building a toilet for an elderly women living near the school.

At a later stage and without pupil participation, the Blair VIP was restyled so that the slab covering the pit was built in two "half-moon-shaped" halves. One half supported the permanent superstructure, whilst the second half could be removed, to allow for emptying of pit content material by specialists (a topic studied at the school and in surrounding areas). The superstructure itself remained the same, thus allowing for pupil participation even with this more advanced model.

**Figure 1: left: Teaching concrete slab construction at school. Right: An early Blair VIP built by boys and girls.**

**Figure 2: Girl pupils from Chisungu Primary school build a full sized spiral superstructure Blair VIP**

## Hygiene, hand washing and menstrual hygiene management

Hand washing facilities at both schools and rural homesteads are rare. But their presence and use is essential if the full advantages of improved sanitation are to be achieved. Various types of hand washer were taught during the program (see photos below). Later a communal hand washing tank was designed which used water economically. Annie Kanyemba also performed studies in menstrual hygiene management in the schools and wrote the excellent booklet entitled "Growing up at school – a guide to menstrual management for school girls" in English, Shona and Ndebele (Kanyemba, 2011). Close communication with the girls was important (see below).

## Studies on urine treatment of vegetables, maize and trees

Earlier studies of the growth of vegetables and maize, which were measured by weighing and comparing treated (with dilute urine) and untreated plants placed in small circular gardens (ring beam gardens), were repeated on a larger scale. These later experiments focused on the growth of green vegetables in larger beds and also maize. Several experiments were conducted on the effects of diluted urine (which contains much nitrogen) on the growth and yield of maize. Of particular interest were further studies made with the growth of trees using diluted urine as a fertilizer. Woodlots planted with eucalyptus were fed with diluted urine (taken from a modified boys toilet where the urine was collected from the urinal and led into an underground tank from where it was pumped into plastic containers using a specially design plastic pump. In later experiments the excavated and processed pit contents taken from toilets (both from the school and from other Blair VIP toilets in the area) were bagged (by trained specialists) and placed in the bottom half of "tree pits" where fruit trees were planted in orchards. These processed materials provided extra potash and phosphorus and some nitrogen which aided tree growth. In Zimbabwe many schools tend to their own gardens, orchards and woodlots. The principles learned can be transferred to the homestead environment.

**Figure 3: Simple hand washer at work. Proud school pupils exhibit hand washers at a showground in Harare. They won top prise. Close communication with school girls helps in understanding the plight of the "girl child."**

**Figure 4: Simple experiments in small "ring beam gardens" reveals the effect of dilute urine treatment on green vegetables and maize. The plants were measured on a scale.**

**Figure 5: Urine is collected in an underground tank from the boys urinal and pumped up with a simple plastic pump. The resulting spinach yields were prolific.**

**Figure 6: Back yard studies revealed that dilute urine treatment could greatly enhance the growth of gum trees used in woodlots. A pupil waters a young gumtree in the school woodlot.**

**Figure 7: Left. A simple upgraded well built by the pupils. Right. The same well upgraded later with a windlass.**

## Upgrading family owned wells

The teaching program extended further to show the pupils how family owned wells could be improved. Earlier work had shown that the quality of water derived from family wells and the safety of the well could be improved by building a hygienic "head works" – that is an apron, raised collar, water run-off and well cover. Two approaches were taught to the pupils, a simpler version without a windlass and an improved version which used a windlass. Many of these had been built in an earlier period in Zimbabwe's rural water program. Further studies in Epworth highlighted a process of upgrading family wells. Family owned wells are very common in Zimbabwe.

## Public demonstrations

The pupils in consecutive years demonstrated their skills at open days and public events and earned certificates for their good work. The method of constructing simple hand washing devices won first prize in an open day at the Mukuvisi Woodlands Centre in Harare and was witnessed by many students from a great range of primary and secondary schools.

## Conclusions

As can be seen, this project encompassed a considerable variety of activities linked to hygiene, water, sanitation and recycling. Even the simple hand washing devices used recycled coke and other cans! All the students involved moved on to other schools, and retain the joy and satisfaction of being involved with such a project. But the project was a "one off" and has not been replicated elsewhere, but remains as a model for uptake by other schools. However there have been several benefits The lower cost, easy to construct Blair VIP developed during this project has since been taught to staff of the Ministry of Health and Child Welfare, where it replaces the original single Blair VIP which is more difficult to build and uses more cement, Its further development into an easily emptied unit, where the pit contents can be processed and recycled for use in woodlots and orchards is also an extra bonus derived from work at the Chisungu school and the catchment area surrounding it. Then work carried out on family wells and hand washing devices has also led to significant developments These developments may have far reaching effects in the future.

We believe important lessons can be learned from this project, which relate not only to the passing on of skills and knowledge to the pupils, but also to the teachers and other interested parties. We hope that in the future these various techniques which are practical and beneficial, and can involve pupil involvement will be taught and taken up on a much larger scale. The chosen methods can be exchanged between schools and private homesteads, further increasing the passage of practical knowledge.

We have written a full account of all the activities and trials in an e-book entitled "Teaching Ecological Sanitation in Schools" which is available on our website at http://aquamor.info/ and also on the SuSanA (http://www.susana.org/) and SEI websites (http://www.sei-international.org). Various other manuals which detail Blair VIP and Family Well design are also available on these websites.

The students of today will become the leaders of tomorrow. What they have learned in schools, both at primary and secondary level will remain with them and influence their lives for decades to come. And practical aspects are equally as important as the academic studies, particularly in the developing countries.

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Further detailed works can be found on the website of Aquamor-Zimbabwe, aquamor.info

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