



# Are Dataloggers the Solution to our Lack of Laboratories?

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## Introduction:

Due to mass failure of Tanzanian students in science subjects, there are many proposed solutions...such as building new laboratories

We have decided to leapfrog these old ideas and investigate the use of Dataloggers. Datalogging involves the use of electronic sensors and interfaces to measure and record changes in variables such as temperature, pressure, pH and so on, during experiments. They provide a dynamic way to teach science anywhere around the school.

The overall objective of this project is to see if by the use of data logging, students can develop a greater enthusiasm and understanding for science, than students who have been taught without data logging using the same curriculum



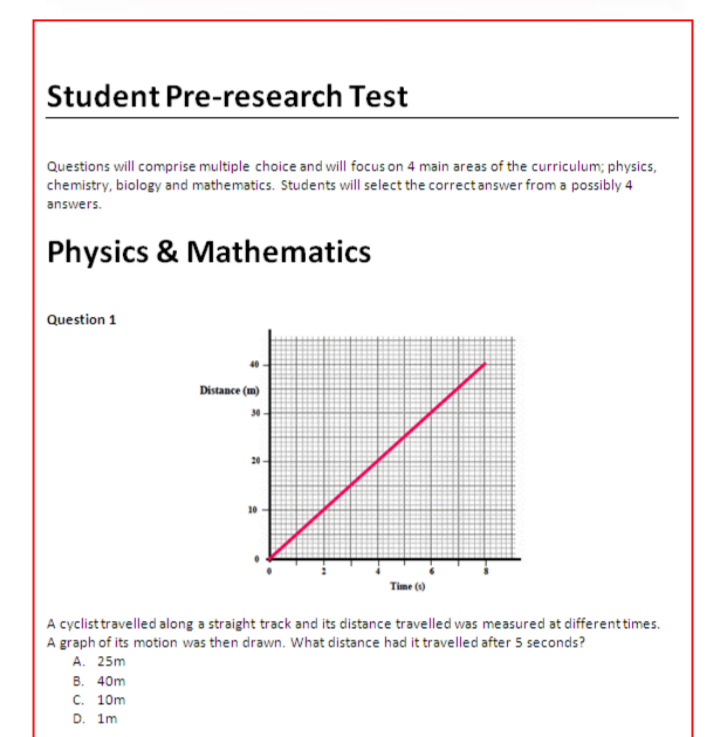
## Method:

A baseline assessment will be established to establish the level of the students who will participate in the project. The students will be divided into two groups; one group (A) will use data logging to carry out some of the core curriculum experiments, and the other group (B) will be taught using the normal methods in the school. Both groups will follow experiments from the standard curriculum.

We took 25 random students from form 5 and asked them to sit the baseline test. The baseline test had 9 Physics/Mathematics questions, 7 Chemistry and 7 Biology.

11 of these students used the dataloggers for the next two months repeating experiments from the curriculum, focussing on graphs, and basic experiments.

After two months we carried out a post-research survey with the same students (22). 11 were the control group and 11 had been using dataloggers. We also interviewed some students and our teacher to see what they thought of the devices.



A sample from the baseline study

## Results:

- Figure 1 shows the results from the baseline study of 25 students. The average result was **76 %**. After our study we carried out another survey. Figure 2 shows the results from the control group.
- The average result is **74 %** which is similar to the initial result.
- Figure 3 shows the results from the datalogger group. The average result is **84%**, an improvement of **10%** compared to the control group.
- Figure 4 compares the results from both groups for each question. Q's 3, 5, 16 and 25 show the greatest improvement. Q's 3, 5 and 25 are related to graphs which is one of the main features of the dataloggers.
- **0%** of the control group got Q3 or Q5 correct, only those from the datalogger group got these questions correct.
- Physics is covered in Q1 – Q9. The total number of correct answers goes from **64% in the control to 76% in the dataloggers**
- Chemistry is from Q10 – Q17. The correct answers increase from **72% in the control to 89% in the datalogging group**
- Biology is covered from Q18 – Q25. The correct answers increase from **69% - 76%**

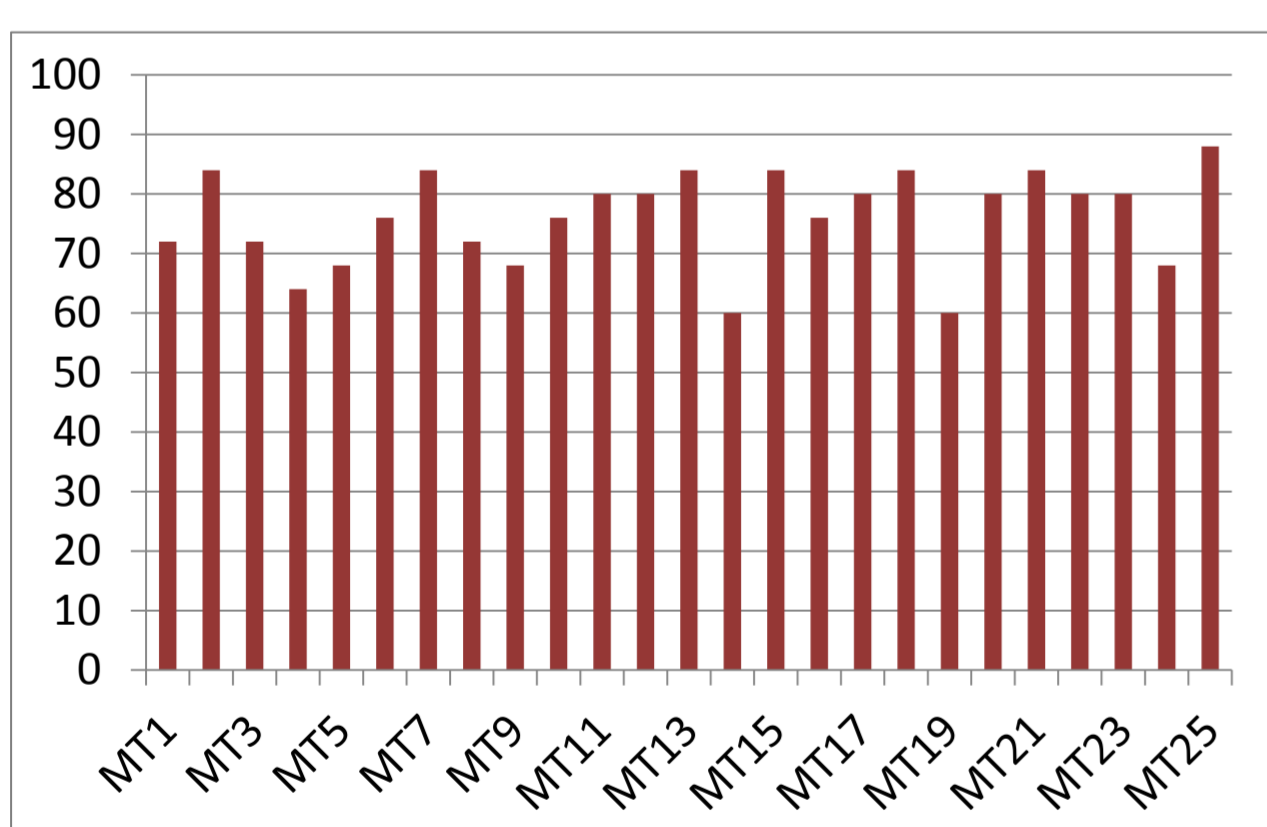


Fig. 1 Baseline study

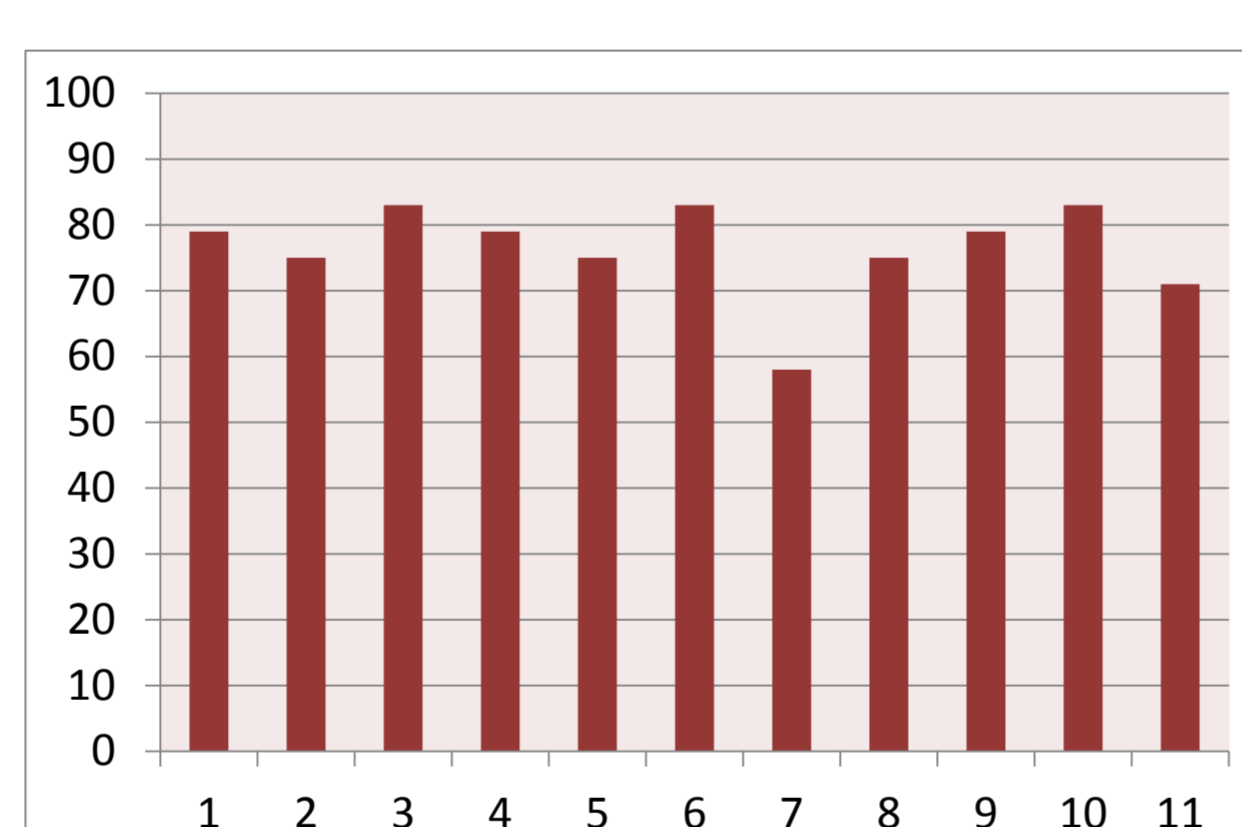


Fig. 2 Post Study – Control Group % for each student

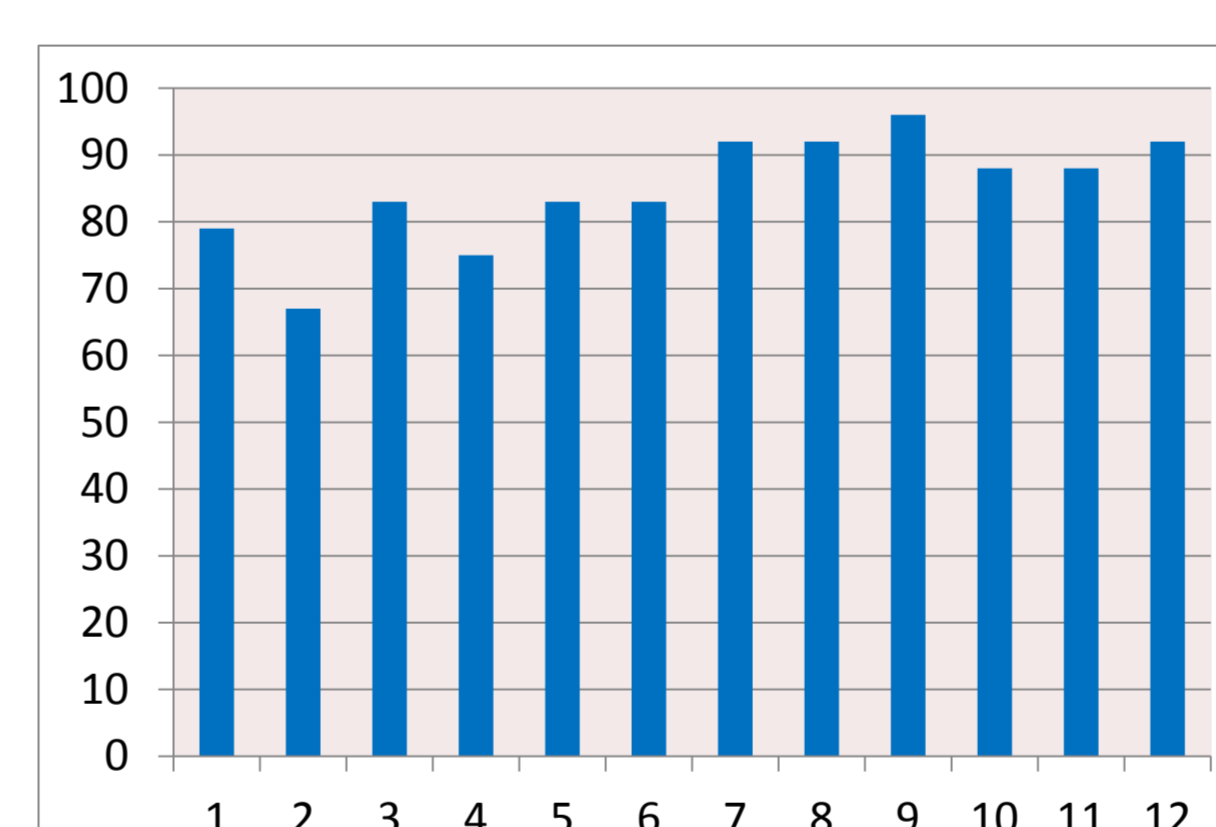


Fig. 3 Post Study – Datalogger Group % for each student

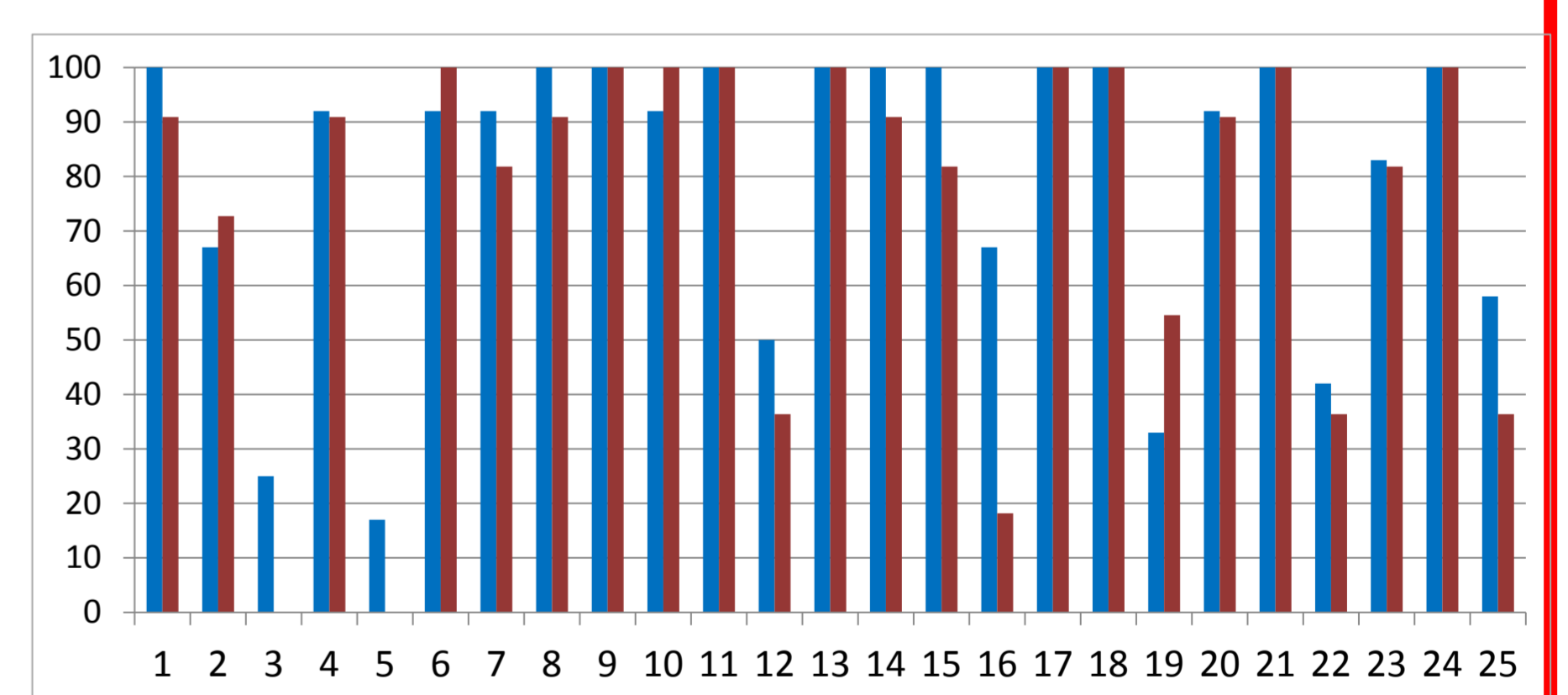


Fig. 4 Post Study – Comparison % for each question

## Sources of Errors

Small sample size – only 11 students were using the dataloggers  
Is the increase due to the dataloggers or the extra practical work of the students?

## What our fellow students said:

“plotting graphs by hand is so slow...now we have **more** time to actually talk about the results”

## Conclusions

The dataloggers resulted in an **improvement** in exam results.  
Students found them fun and exciting to use – made learning more interesting  
Teachers were also very interested to use new methods  
They are future proof – can be used with smartphones for sharing results  
One set per 4 students means they can teach large classes

## Future Work:

We are interested in comparing girls against boys – our post survey has this data  
Carry out a class sized test or even a **Form** sized test.

## References

Hardman, et al., 2011 Developing a systemic approach to teacher education in sub-Saharan Africa: emerging lessons from Kenya, Tanzania and Uganda. *Compare: A Journal of Comparative and International Education*, 41(5), 669-683.

Walshe, A. M. (2003). *The role of Hand-held datalogging technology in Junior Certificate Science*. Dublin City University

Vernier.com

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