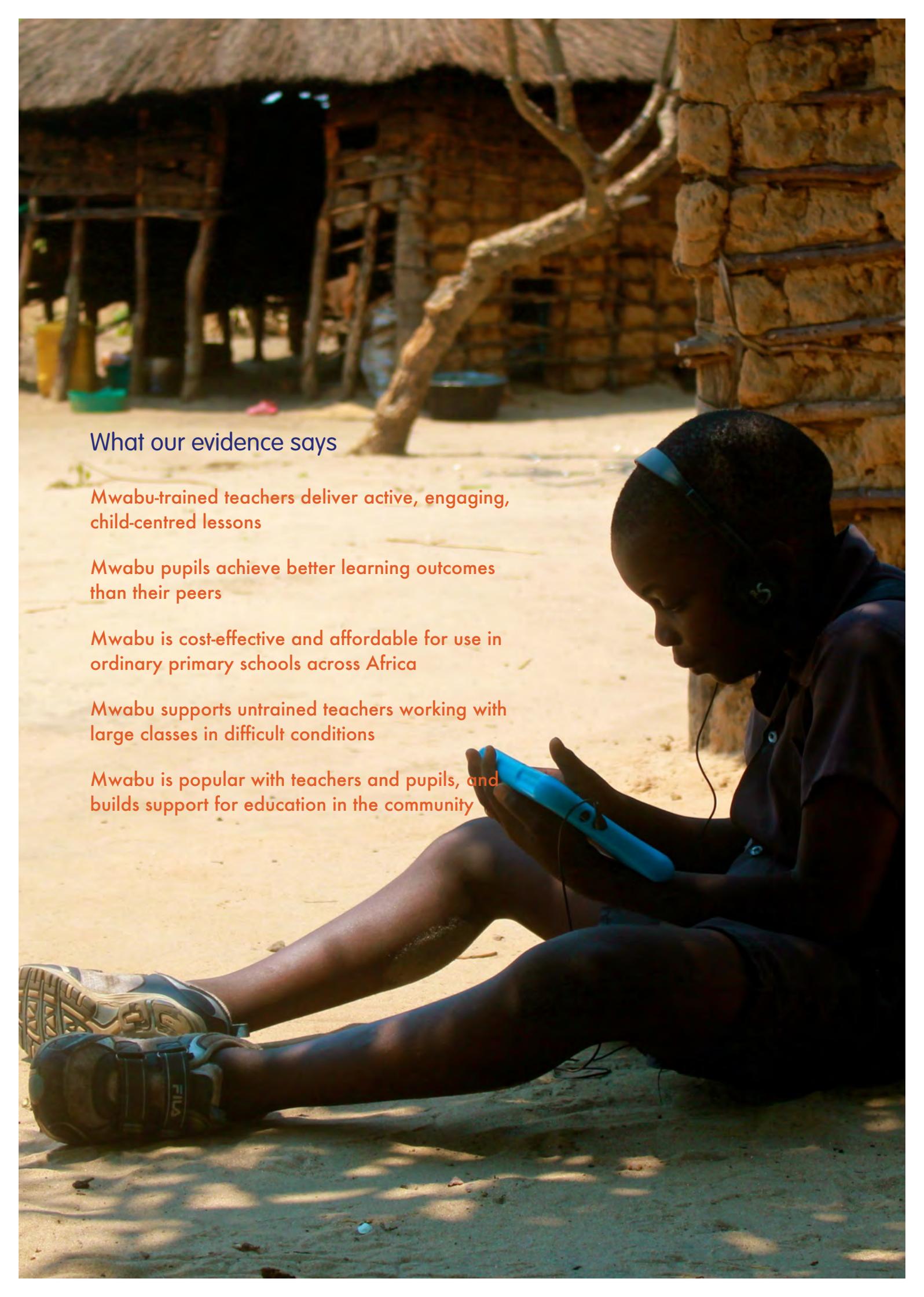




# Mwabu: The Evidence





## What our evidence says

Mwabu-trained teachers deliver active, engaging, child-centred lessons

Mwabu pupils achieve better learning outcomes than their peers

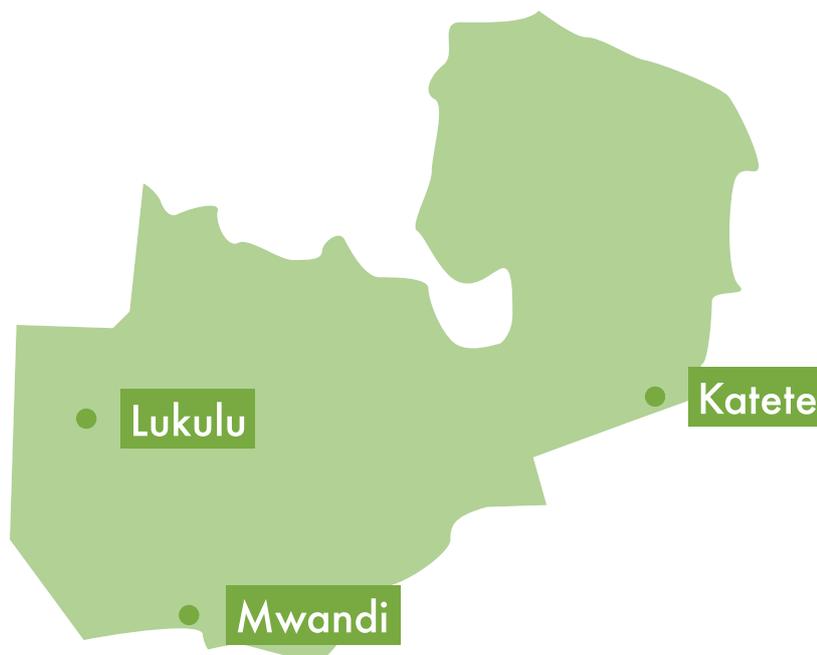
Mwabu is cost-effective and affordable for use in ordinary primary schools across Africa

Mwabu supports untrained teachers working with large classes in difficult conditions

Mwabu is popular with teachers and pupils, and builds support for education in the community

## Where our evidence comes from

The evidence in this report is drawn from three multi-year comparative studies on the impact of Mwabu, which are all being undertaken in highly impoverished, remote rural areas.



### Lukulu

The Lukulu project was funded by UNICEF in 2014-2015. The project targeted five schools. UNICEF conducted a treatment / control comparison of learning outcomes over a year, as well as qualitative assessments of project impact.

### Mwandi

The Mwandi project is implemented by Mwabu in six schools, with support from the Peter Cundill Foundation. The project launched in 2015, and the first annual follow up study was finalised in September 2016.

### Katete

Impact Network uses Mwabu in 9 community schools in the rural villages of Katete District. The project launched in 2013, and the first annual follow up study was finalised in September 2014. The evaluation strategy focuses on a rigorous randomised control trial of learning outcomes. Further results are expected next year.

**Note on terms:** Mwabu was launched in Zambia as iSchool, and the tablets were called ZeduPads. These terms are only used in the report in the context of direct quotes from teachers or pupils.

## Mwabu-trained teachers deliver active, engaging, child-centred lessons

### Effective teacher training

Mwabu's initial teacher training and strategies for continuing support have evolved over the years, building on lessons learned. There is now a well-developed strategy for introducing Mwabu to teachers, head-teachers and supervisors, and for building capacity to oversee and provide continuing support to teachers, as they adapt to using the tablets and using new approaches to teaching.



Were confident  
with tablets



Said training  
was adequate



Said Mwabu had  
positive impact

Thirty teachers who were trained in Mwanzi were interviewed after one year of implementation:

- 82 percent described the training as completely adequate or adequate.
- 73 percent of teachers describe themselves as very confident or confident using the tablets as part of their teaching, and a further 22 percent as average.
- Teachers used Mwabu tablets and pedagogy correctly in all classes observed.
- Out of 27 responses on a question about constraints to performance, only one suggested that inadequate training was a problem.
- Out of 39 suggestions for improvement, only two identified additional training, and two more suggested more interaction with other teachers using Mwabu.

The comments and suggestions made by the head teachers and local education officials were well informed, and consistent with the teachers' views. They described how they interact with the Mwabu programme during the course of their work, for example via teacher support, training and school inspection.

## Pupils readily adapt to Mwabu



Children adapt readily to using Mwabu, even where it is clear that those children have had extremely limited access to technology. Children in remote rural areas have embraced the opportunity to use Mwabu tablet. The picture is from the UNICEF Lukulu project, showing Mwabu being used in a class taught outside, in a district where access to basic phones and even radios is limited, and where preparedness for use of IT at school is almost universally lacking. Even in such extreme circumstances, children have some awareness of technology in the wider world, and are very excited to have an opportunity to use the tablets.

When asked if they had problems using the ZEDuPad, grade two pupils in a focus group discussion said:

It is easy to use; I think almost everyone in class knows how to use the ZEDuPad

We are comfortable! At first it was hard but after a few days we all knew how to use the ZEDuPad

## High quality lessons

Mwabu is designed to improve the quality of teaching and learning in ordinary classrooms across Africa. This depends on ensuring that lessons are well planned, that teaching moves away from traditional “chalk-and-talk” (often the only option in under-resourced schools, and for teachers with large class sizes), and that pupils learn through engaging in a range of different, stimulating activities.

New national data shows positive relationship between teaching styles and learning outcomes, and specifically that the frequency of questions that a teacher asks a student is a strong indicator of higher learning outcomes.<sup>1</sup> Similarly, children learn better when they are actively involved in a task, rather than passively listening or watching. After one year of Mwabu implementation in Mwandi schools, lesson observations show a range of improvements compared to classes in a control group.

<i>Mwabu classes</i>	<i>Classes in other schools in the district</i>
All involved in group work, all conducted enquiry	Half go into groups and conduct any sort of enquiry
55% asked open-ended questions	42% asked open-ended questions
40% of teachers asked follow-up questions when the pupil gave the correct answer	None asked follow up questions
25% had individual pupils called to write on board, while others sat and watched.	50% had individual pupils write on the board while others sat and watched
Peer-to-peer support observed in all classes	No peer-to-peer support observed in half the classes
All teachers used three-group rotation successfully	
50% of GRZ Mwabu teachers used songs, games, poems or stories	25% of control group teachers used songs, games, poems or stories

Lesson observations form an important part of Mwabu’s new approach to performance evaluation, providing valuable feedback to guide the project management team on the next steps to support teachers’ continuous professional development.

<sup>1</sup> World Bank. 2016. Education Sector Public Expenditure Tracking and Service Delivery Survey in Zambia. World Bank, Washington, DC.

## Mwabu pupils read in every lesson

Mwabu lessons require pupils to read in every lesson, at a level appropriate to their age. Lessons are also vocalized, and children’s learning is enhanced by simultaneously following text and hearing.

All children in the Mwabu schools in the Mwandi project were observed reading during every observed lesson. In contrast, one-third of the children in the control group schools were not seen reading at all during the course of observed lessons.



## Teachers agree that Mwabu improves lessons

The evaluation of UNICEF's Mwabu programme in Lukulu asked teachers what they think of Mwabu:

*I think one of the experiences I've observed is that the coming of these ZEDuPad has really increased my interaction with my pupils. It has also improved the relationships amongst pupils themselves. They are able to ask each other where they need help, unlike the way it used to be previously where I'd just stand in front of them, teaching without text books and then in the end pupils will just go and some won't even ask even a single question.*



*There are many skills that pupils have gained like listening skills, writing skills, skills in discussions and interactive skills.*

*With iSchool which has come in, even the rapport with the pupils has really changed. In the olden days the pupils were not so free to interact with me as a teacher but this time around they are able to interact with me as a teacher even outside meaning the learning has become easier for me.*

*The classroom management has been good because as learners do independent work, you just go round checking while others are busy on the computers. So, the learners have stopped making a lot of noise because those who are on tablets are busy listening to what they are doing. The other two groups are busy doing the activities and you are there monitoring them. So I have seen that it has really helped us.*

*I've learned to listen to the pupils' ideas and answers, and not reject them*

Teachers also highlighted their use of the lesson plans, commenting that they find it easier to meet curriculum objectives:

*Before using the ZEDuPad, lesson planning used to be hectic because the teacher had to scout for materials here and there, we had no teacher's guides and text books. With the introduction of ZEDuPad, everything is there as a teacher, even the objectives, we struggled as teachers so somehow work was so cumbersome for the teacher.*

*I'd also say that with the coming of ZEDuPad, the workload on the teachers has really reduced. Everything is planned for us. Work is just to go through them, read what you're supposed to impart to your learners and then just look for teaching and learning aids in case you need to prepare them. So I'd say we really appreciate it because our work has been reduced.*

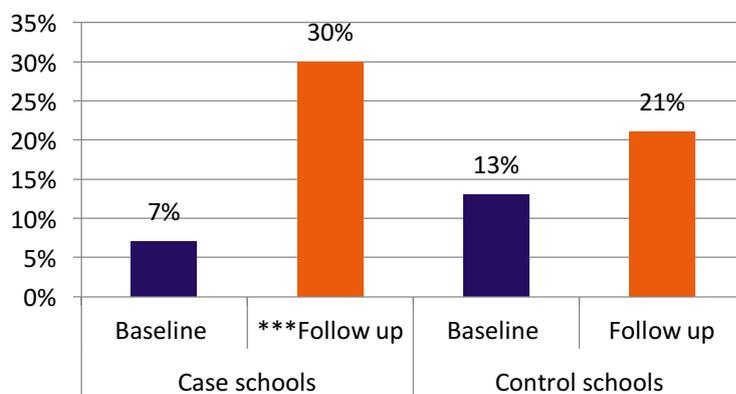


## Boys and girls taught with Mwabu achieve better learning outcomes than their peers

Mwabu has been subject to rigorous impact evaluation, comparing improvements in numeracy and literacy between Mwabu schools and similar schools selected for control purposes. These evaluations have taken place in rural and urban Zambia, and been conducted by UNICEF and the Impact Network, as well as by the Mwabu team. They have used the USAID-developed EGRA and EGMA (Early Grade Reading / Maths Assessment) standardised tests for early grade assessments, translated as necessary into local languages.

The results consistently show significantly higher improvements in learning outcomes for pupils learning with Mwabu.

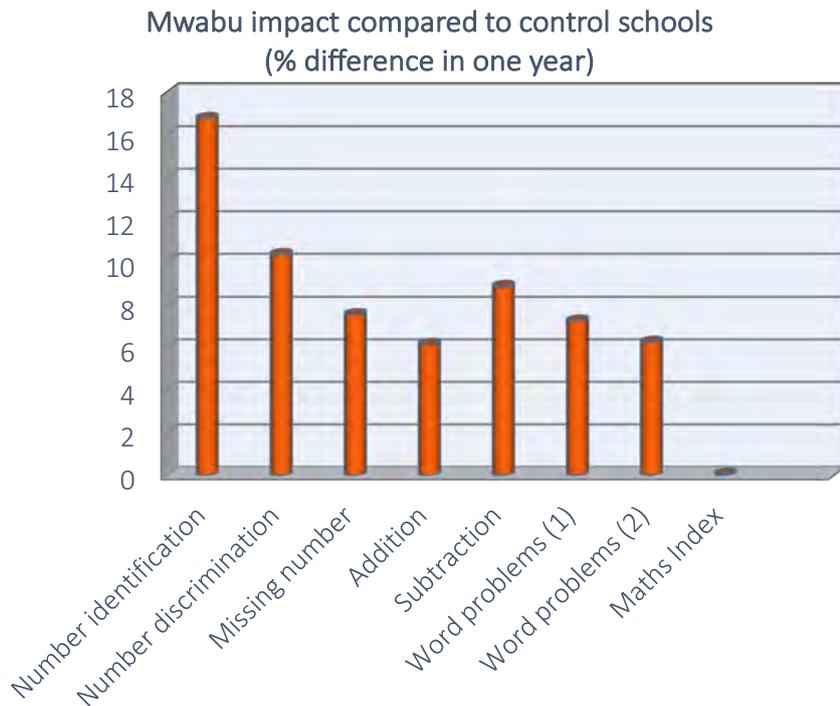
**EGRA literacy scores at baseline and year 1, Lukulu**



In Lukulu, in the remote Western Province of Zambia, UNICEF research showed a significantly greater improvement in literacy in Mwabu schools over the period of just one year, between grades 1 and 2, as compared to the control group schools.

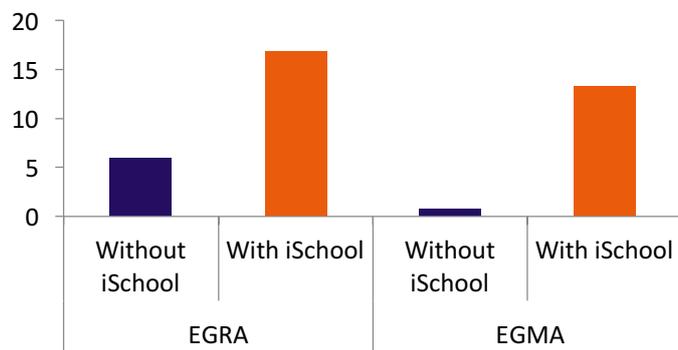
\*\*\*Indicates statistical significance at  $P < 0.01$

The same report presents the maths results differently, but they also indicate a positive result in all but one of the elements of the EGMA test. The graph shows the difference-in-difference after one year, i.e. the percentage points by which Mwabu pupils’ performance exceeded the performance of the control group pupils on the EGMA test (for example, on the first column on number identification, the average gain in performance for Mwabu pupils over one year was 16 percentage points greater than the average gain for control group pupils).



Mwabu’s own studies tracked performance of somewhat older pupils in five community schools in high-density residential areas in Lusaka. These schools serve the poorest children, and are usually under-equipped with under-qualified teachers. Results showed significantly higher learning amongst pupils using Mwabu compared to those who do not, in both literacy ( $p < 0.05$ ) and numeracy ( $p < 0.01$ ).

**Student Growth in Literacy and Maths over 1 year in in grades 4 & 5**



Further randomised control trials have been started in the Mwandi project, and also in Northern Zambia in partnership with World Vision International, and first results for are expected in 2017.

## Girls and boys learn equally well with Mwabu

Over the years, national data shows that as girls progress through school, they start to fall behind. This is especially pronounced in maths. It is essential that Mwabu addresses gender disparities, starting with a strong start in the early primary years represents the first step towards addressing these disparities.

The evaluation of the UNICEF project in Lukulu suggested that girls learning with Mwabu were keeping up with or getting ahead of their male peers in the early grades, while those in control schools fell behind. This pattern was suggested in both literacy and numeracy, although it was not analysed in terms of statistical significance.

The evaluation in Mwandu assessed the capacity of children to use the tablets at the current point in their curriculum. Pupils are rated as confident, cautious or struggling, depending on their performance in recent lessons. Results from six schools showed that there are fractionally more girls who are confident users than boys. The lesson observers reported that out of 19 cases where boys and girls shared the use of a tablet, 16 concluded that the girls and boys had equal opportunity to handle and use the tablet, while three said boys tended to take the lead. Review of the rest of the data did not identify any systematic differences by sex.



Ensuring that girls get a fair chance in primary school remains a high priority on a global scale; evidence to date shows that Mwabu is certainly addressing disparities and improving opportunity for girls.

## Mwabu is cost-effective and affordable for use in ordinary primary schools across Africa

Mwabu has been rolled out via comparatively small-scale interventions with partners, typically covering 5 to 10 schools at the recommended ratio of one tablet per six children, plus one tablet per teacher.

At this scale, and assuming the tablets have an average life-span of three years, the cost of providing both hardware and software content is around \$19 per pupil per year (excluding start-up costs, secure storage and the provision of solar equipment where necessary).

Besides the tablet and its content, Mwabu has contributed to improved teacher performance. This is most evident where teachers are unqualified, and where few other teaching or learning resources exist. Mwabu provides valuable assistance to teachers handling very large class sizes, providing a structure and tools to support differentiated, active and engaged learning even in classes of over 50 children. The cost of Mwabu can be compared against other initiatives to address these constraints:



- The cost of providing textbooks to primary school pupils is estimated at between \$3.30 and \$10 per pupil per year for five subjects at primary level, depending on assumptions e.g. the life-span of the book.<sup>2</sup> In the event that a school uses Mwabu, the need for text books can be reduced significantly, as many of the necessary materials can be provided on the tablet.

<sup>2</sup> Fredriksen, Birger, and Sukhdeep Brar, with Michael Trucano. 2015. *Getting Textbooks to Every Child in Sub-Saharan Africa: Strategies for Addressing the High Cost and Low Availability Problem*. Directions in Development. Washington, DC: World Bank

- Reducing the teacher-pupil ratio from 1:50 to 1:40 in a school of 500 children requires 2.5 additional teachers per school, or \$23,750 per year,<sup>3</sup> assuming these teachers are available, creating an additional cost of \$47.50 per pupil per year.
- The cost of in-service training for teachers on a residential basis at a district level is approximately \$1000 per person per week, using GRZ costs and allowances. If teachers are deployed on the basis of a 1:50 pupil-teacher ratio, the cost of a week's training is \$20 per pupil.

The UNICEF evaluation also highlighted comments from teachers, about how Mwabu helps them and the schools to save money at a local level:

*Before the introduction of ZEduPads, there were a lot of expenses. For example, as teachers we had to buy a lot of pens and books where we would write our plans. So a pen wasn't lasting even a week. A pen would run out maybe just after three days but now on the introduction of ZEduPads, my pen can even last for two weeks, even the number of books that we use is maybe just a book instead of using 50 books. I think I'm pleased with that.*

*Our expenses have greatly been reduced as well on the part of the school like others have said. We used to spend a lot sometimes we even ran out of cash in order to acquire materials and resources which the teachers need for effective teaching and learning. This time, just this term, we have actually saved a lot of resources.*



## Mwabu provides effective support for untrained teachers working in difficult conditions

Mwabu is being used in over 100 schools in Zambia, most of them in remote rural areas or high-density urban areas. Many of these schools do not have electricity, the buildings are run-down, windows may be missing. Some are simple mud and thatch structures. Inside the classrooms, there is rarely much besides a chalk board and desks, and the pupils' own pencils and exercise books; many of the schools using Mwabu have no text books.

### Suitable for use in difficult environments

Mwabu tablets work off-line. They have proved robust, and the solar system provides enough charge for tablets to run throughout the school day. The bumpers provide a good level of protection. The most common repair, easily and cheaply undertaken, is to replace the screen.

A teacher commented in the UNICEF focus group:

*Yes, you know this school is a community school so we don't have text books so it was very difficult for us to teach without text books. Where do you get the information? But when the ZEdupads were brought, It's very easy, because we don't need textbooks to teach, because every lesson has been made in such a way that it's a book on its own. And also the ZEdupad has books, so we don't need another text book to teach a lesson.*

Security has been generally good, and the tablets are less of a target than other devices (e.g. a laptop or iPad). The tablets are small enough to be packed up and locked away at the end of the day. Only one major theft took place in a Lusaka school, but the parents identified the thieves and retrieved all the tablets.



## Equipment has proved robust

The Mwandi evaluation included a review of the status of the equipment, 14 months after distribution to the schools. The rate of breakdown of the Mwabu tablets is very low. Six (2 percent) of the 325 tablets inspected were reported to be damaged or faulty. Teachers also commented on the reliability of the tablets. 86 percent of teachers interviewed indicated that the tablets breakdown “rarely” or “never”, and the rest said “average”; none of the respondents indicated that breakdowns were “frequent” or “very frequent”.

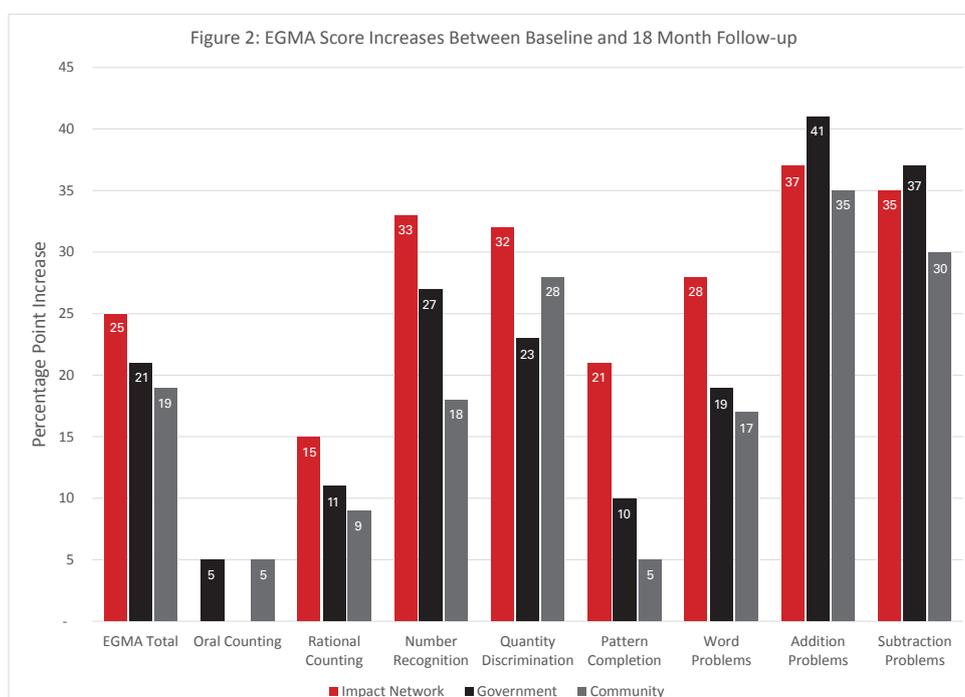
The stocktake found that 97 (13 percent) of the 721 headphones were no longer working properly, and were in need of replacement. Although this breakage rate is higher than might be considered ideal, it is worth noting that the headsets are light-weight, and are taken on and off at least six times in each Mwabu lesson. There is clearly a trade-off between quality and price; a 13 percent rate of breakage in just over one year suggests that planning to replace a proportion of the current low quality headphones is more cost-effective than investing in more expensive equipment.



## Untrained teachers benefit greatly from Mwabu

The Impact Network in Katete, Eastern Province, provided Mwabu as a major component of their support to community schools. Community schools are generally cheaper, less well-resourced and less well staffed than Government schools, and have lower learning outcomes. The Impact Network schools operate with unqualified teachers, and have a total budget (including staff) of just 27 percent of the Government schools in the same area. After one year, Impact Network compared performance between their supported community schools, control community schools, and Government Schools. Their findings show that pupils using Mwabu not only learned at a faster pace than pupils in other community schools, but by most indicators improved their scores by more than pupils attending local Government schools.

The graph below shows the data for improvements in EGMA scores between grades 1 and 2:



This supports the argument that the performance of untrained teachers in the lowest budget schools can be greatly enhanced by Mwabu.

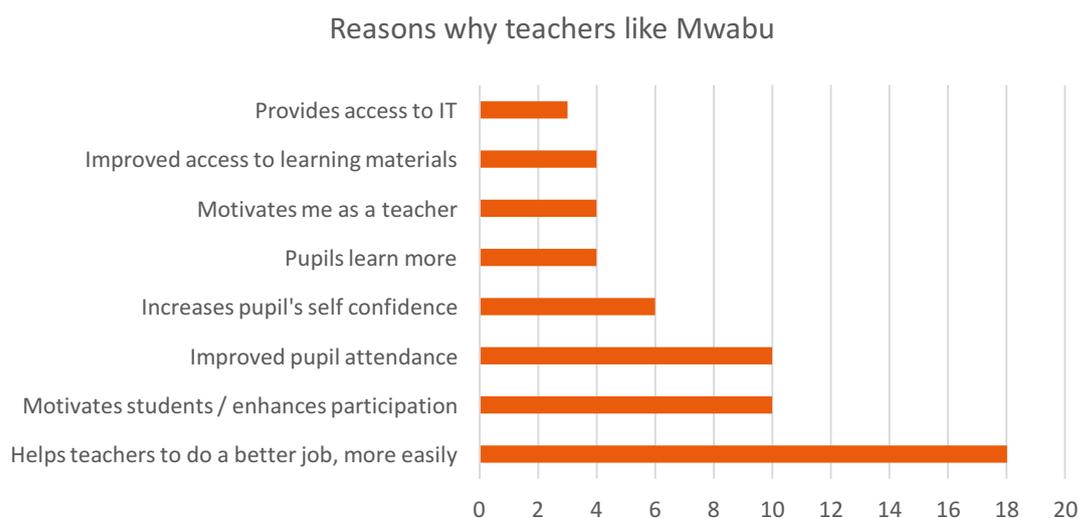
Similarly, in Mwandi, pupils in the Alibuzwe community school showed particularly strong skills in using the tablets, in fact exceeding project targets for pupil performance. Alibuzwe School is a remote rural school with 70 pupils and 1 untrained volunteer teacher in a temporary shelter. The evaluation tested 21 grade 2 to 4 pupils and found all but one of them rated as confident users – getting over two-thirds of questions correct on the first or second attempt. These results support the argument that Mwabu can be used to support learning in the most challenging of environments.

## Mwabu is popular with teachers and pupils, and builds support for education in the community

### Teachers like Mwabu

Evidence suggests that teachers like Mwabu, and believe that it helps them.

Mwabu’s recent trial in offering tablets directly to teachers (those who are not involved in Mwabu projects) has yielded sales of up to 400 tablets a month. Teachers buy the tablets themselves, to help them do their job. In circumstances where teachers are often criticized for lack of motivation, and for demanding “incentives” to adopt innovation and change, this is a very significant result. In Mwandia, all teachers using Mwabu were asked if they liked using the tablet, and if so why. All but one teacher gave a positive response, and their reasons were principally focused on the improvement in teaching and learning, and on associated benefits including pupil attendance and motivation.



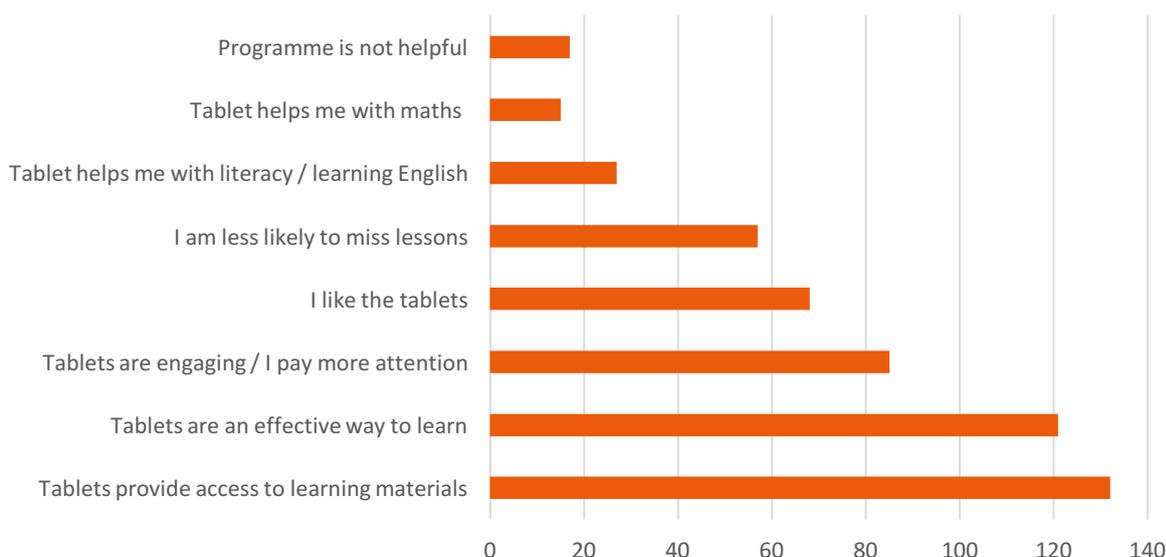
The UNICEF Lukulu evaluation presented several comments suggesting improved motivation and attendance amongst rural teachers:

*It is not only improvement in the learners but even teachers. The improvement is that before if maybe I didn't plan [a lesson], didn't write this and that – so I would just say I'm sick or something. But now the lesson plans are there. So the attendance even of teachers, it is high.*

## Pupils also like Mwabu

The Mwandi evaluation asked over 700 pupils in grades 2 to 4 about their experiences of iSchool. It is evident that the presence of the project provides a range of strong reasons for pupils to be positive about coming to school; they like the programme, and they are clear on why this is so. The graph shows that children appreciate access to learning materials, and that they like learning through the iSchool methods.

Is iSchool helpful? How is it helpful? Pupils' responses (number)



In Lukulu, team evaluating the UNICEF programme also asked the children what they liked about Mwabu.

One pupil in grade one said:

I like a class with computers because computers are very good, I like coming to school because learning is now interesting.

A grade two pupil also highlighted the fact that the tablet also poses questions (and provides feedback), as compared to the time before the project:

We feel good learning Maths. I like answering questions on the tablet, this year is better than last year.

Another grade two pupil expressed her appreciation quite simply:

*We like the computers, because we feel nice when we click.*

## Parents and the community like Mwabu

The UNICEF evaluation of Mwabu in Lukulu suggests that the intervention created positive change in parents' attitudes, which can be assumed to create positive support for improving attendance and retention. Teachers commented:

*Like at our school now with the introduction of the ZEDuPad, some of the parents even come to classrooms! They want to observe their children learning. Afterwards, when they go back, some of the parents who have money even asked about the prices, so that they can buy for their own children. At one time when we had open day, we even invited some parents to come and see (the tablets). One of the parents gave us some cakes, even the head was given a cake, as an appreciation.*

*Like for our school before the coming of iSchool, the number of learners that we used to have in classes was so low compared with the coming of iSchool. [Now] almost every day, our senior teachers are busy receiving letters of transfer from other schools. Some people who are outside our school are thinking of bringing their children to our school just because our school is using these ZEDuPads.*

The UNICEF evaluation comments that pupil absenteeism is a common problem, especially in rural areas. The evaluation reports that since the introduction of Mwabu in pilot schools, teachers have noted that the number of pupils missing classes reduced. One focus group discussion participant elaborated:

*The attendance has been affected positively because pupils are interested, they've heard about the tablet, they want to touch it, they want to listen, they want to use it to learn. So attendance has greatly improved even enrolment has improved. We had an increase and those that may have dropped have shown interest of coming back to school so that they learn using the tablet.*

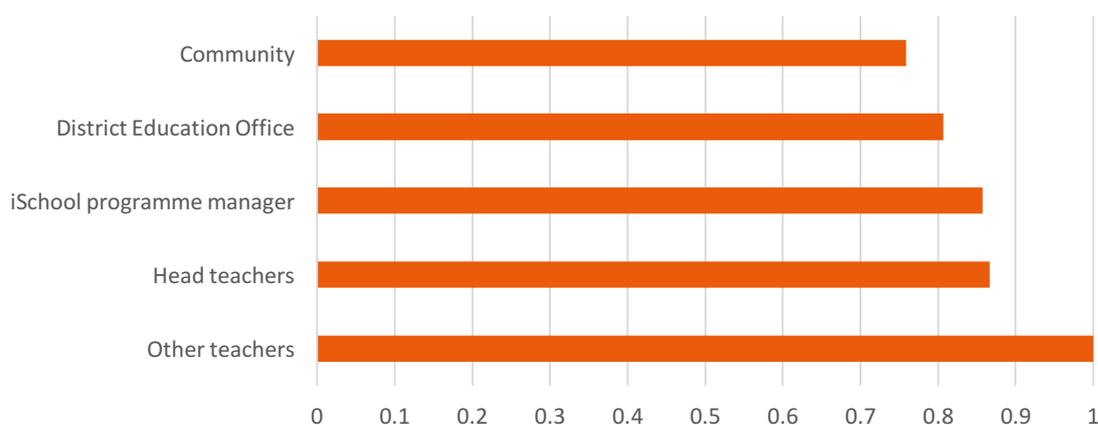
In Mwandu, the issue of attendance was also discussed, and will be examined more closely in a special study.



## Working together to improve education

The Mwandi teachers are very positive about their interaction with other stakeholders in support of successful implementation of Mwabu. This community-wide commitment to using Mwabu as an opportunity and a resource to improve education in a very difficult environment has been critical to a successful first year of implementation, and a key to building and strengthening the project, for the benefit of a very vulnerable and marginalised community.

Interaction with other stakeholders in support of successful implementation of Mwabu  
(percent of teachers saying interaction is very positive or positive)





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