Building a low-cost data management system for a rural NGO

Bulungula Incubator (BI) is located on the beautiful Wild Coast in the Eastern Cape, one of the least developed regions in South Africa. When BI was established in 2007, only 10% of adults in the surrounding communities had matric and half of families had lost at least one child, in part due to the disease burden associated with a lack of clean water and sanitation.

BI's mission is to address the challenges of poverty in these communities whilst preserving their traditional lifestyle and culture.

To catalyse development, BI has implemented three initiatives: Education; Health & Nutrition; and Sustainable Livelihoods.

This case study looks at how Firdale Consulting assisted BI's Education Initiative by collaboratively developing an effective but low-cost data management system.

Programme expansion resulted in increasingly complex data

Since its inception in 2007, BI's Education Initiative has implemented online teaching and learning programmes at seven local schools. Recent school-leavers are hired as Facilitators to run small extra-curricular classes where they guide learners through the online programmes. As the Education Initiative grew, it became increasingly important, but also challenging, for the Coordinators to know whether the programmes had been running as they should.

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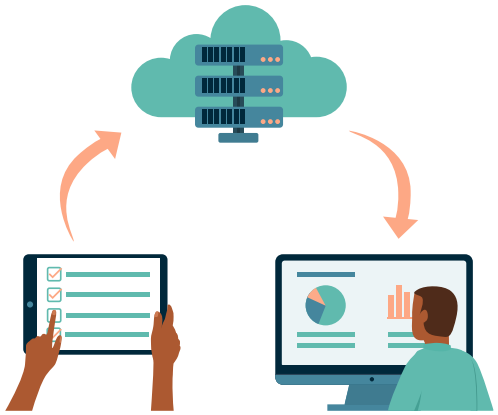
The key indicator the Coordinators wanted to monitor was attendance rates. They wanted to quickly view the average attendance rates over different time periods per learner, class, grade and school. Before Firdale Consulting's involvement, calculating attendance rates was a time-consuming and challenging task: Facilitators recorded learner attendance using pen and paper, entered these data into Excel, calculated attendance rates and generated graphs.



To overcome these issues, BI's Education Initiative needed Firdale Consulting to build a data management system that would **achieve three tasks**:

1. Allow Facilitators to electronically record learner attendance ("data collection")
2. Store the attendance data securely ("data storage")
3. Display a dashboard that allows Coordinators and the management team to monitor learner attendance in real time ("dashboard functionality")

The solution had to consider the following constraints:

1. Cost: BI had relatively limited budget
2. Training: The BI team had limited time availability to learn a new data management system
3. Ease of use: Facilitators have a short time window to record attendance data each lesson
4. Internet access: Facilitators lack reliable internet access in their lessons
5. Data security: Confidential attendance data are collected which require secure online storage
6. Real-time integration: The Coordinators and management team need regular oversight of the Initiative, so attendance data must automatically populate the dashboard in real-time

The solution had to incorporate the following strengths:

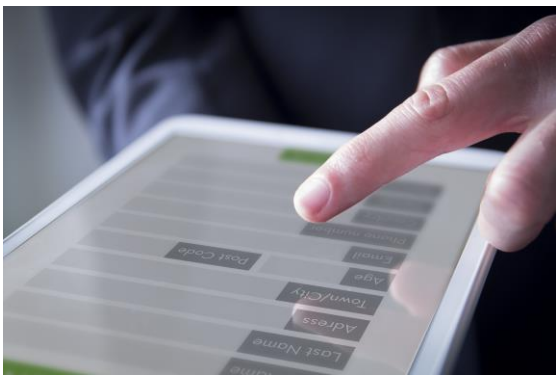
1. The BI team was unified in seeing the value of such a system
2. There were a number of tech-savvy BI team-members who were eager to learn
3. Over 20 tablets had been donated to BI by a funder

The optimal data system was selected by reviewing needs, strengths and constraints

We reviewed a variety of data management systems and found that those with in-built functionality for data collection, data storage and dashboard functionality were generally expensive. We therefore designed a cost-effective solution using three different, free software packages to carry out each task. We integrated these software packages to form a cohesive data management system using public-access APIs and code.

A. Data collection app

For the electronic attendance registers, Firdale Consulting created a short-list of data collection applications. To select the app best suited to BI's needs, we evaluated each against BI's criteria. These criteria included: free/low-cost, simple to use, compatible with BI's tablets, functional with intermittent internet access, and able to integrate seamlessly with secure data storage options. We selected Open Data Kit (ODK) as the data collection app.



To equip BI's team to use the ODK app, we conducted two workshops on-site at BI with the Coordinators and Facilitators.

The first workshop guided the Coordinators to use the back-end of the app to create and update the attendance registers. The second workshop showed Facilitators how to use the app on tablets to take attendance registers.

Firdale Consulting provided the teams with short guides to assist them in the future. These workshops ensured that the team felt confident using the data collection app, that they could maintain the app independently and, most importantly, that they had a sense of ownership over the data collection solution.

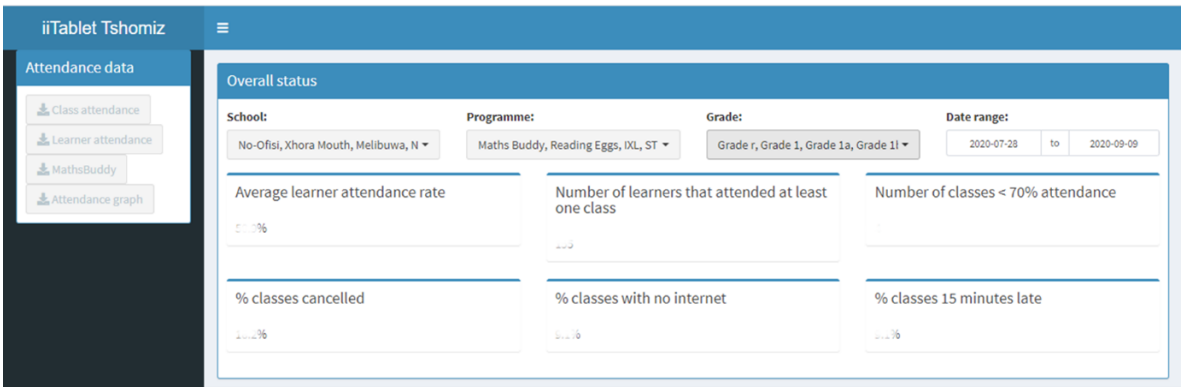
B. Data storage

The next consideration was where the attendance data would be stored. The data collection app we selected integrated well with a variety of cloud-based options for data storage including Google Drive. We reviewed each cloud-based option against BI's criteria: free/low cost, secure, easy to use, and seamless integration with affordable dashboard software.

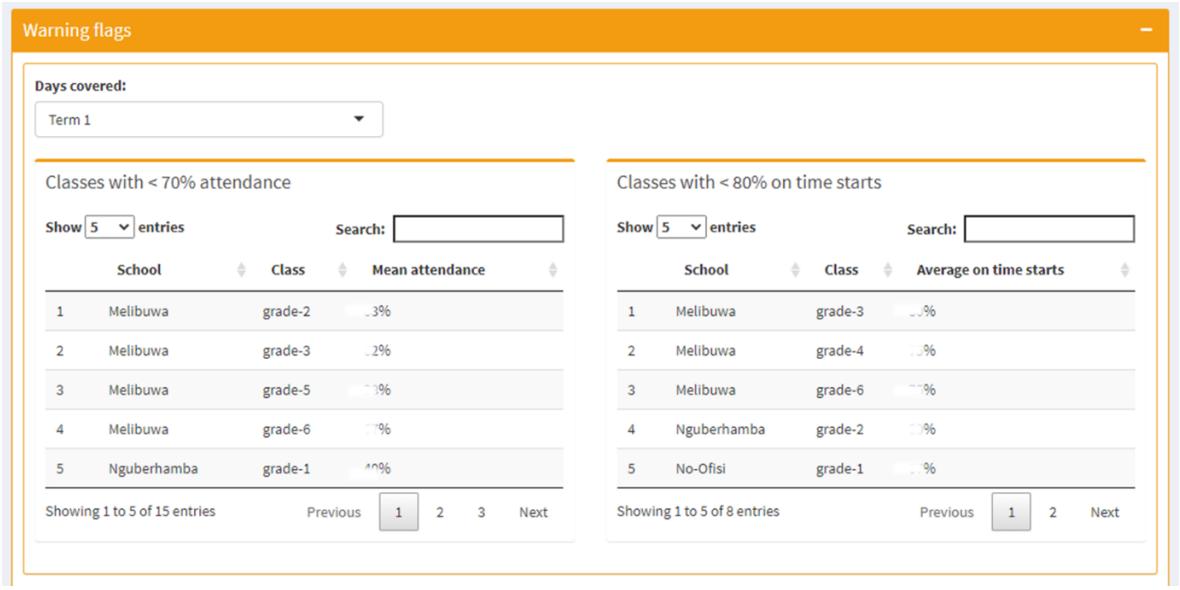
Many of the options offered good data security. However, we selected Google Drive as BI was already familiar with it, making it easy for the team to use. Furthermore, Google's commitment to open-source, low-cost software meant that APIs were publicly available, allowing us to easily integrate with a variety of dashboard options.

C. Dashboard functionality

The electronically stored attendance data are automatically fed into the dashboard, allowing programme managers to monitor the Education Initiative in real time. At the end of every school day, programme managers can quickly check if Facilitators had conducted their classes as scheduled and check on each class's attendance rates.



Programme Managers can also download each learner's attendance data. This allows them to identify the learners with the highest rates of absenteeism. Similarly, a 'warning' system identifies classes that have low attendance rates, classes that seldom start on time, and Facilitators who are not regularly recording learner attendance electronically. These 'warning flags' allow the Facilitators to take the necessary course of action before the problem escalates.



The dashboard also "saves time in report writing as data are generally in one place and the necessary indicators are easily available reducing the time required to produce annual reports" (BI Coordinator). In the past, Programme Managers first entered the year's attendance data into Excel and then produced statistics and graphs. Now, all statistics that need to be included in the annual report can be found on the dashboard, and Programme Managers can download a bar chart of attendance rates with the click of a button.

The end product was a data collection, storage and analytic tool

BI's Education Initiative needed a data management system so that managers could easily monitor attendance rates and intervene timeously where necessary. This required an electronic data collection tool, a place to securely store the attendance data, and a dashboard.

Designing the data management system was a collaborative process. Firdale Consulting made sure that the BI team bought into our proposed solution by holding training workshops and having their team lead the dashboard's design. The end result is a dashboard that BI regularly uses to monitor their rapidly growing Education Initiative.