

An implementation evaluation of the Ukufunda Virtual School

September 2016

An implementation evaluation of the *ukuFUNda virtual school*

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ACRONYMS

BYOD	Bring Your Own Device
CFS	Child-Friendly Schools
CSTL	Care and Support for Teaching and Learning
DBE	Department of Basic Education
DIY	Do-It-Yourself
EFA	Education For All
ELC	e-Learning Coordinator
FET	Further Education and Training
GBEM	Girl/Boy Education Movement
HEDCOM	Heads of Education Departments Committee
ICT	Information and Communication Technology
ISPFTED	Integrated Strategic Planning Framework for Teacher Education and Development
KB	Kilobyte
KZN	KwaZulu-Natal
LER	Learner: Educator Ratio
LTSM	Learning and Teaching Support Materials
m-learning	mobile learning
MB	MegaByte
MDG	Millennium Development Goal
NICPD	National Institute for Curriculum and Professional Development
NMMU	Nelson Mandela Metropolitan University
NSNP	National School Nutrition Programme
PCA	Programme Cooperation Agreement
PLC	Professional Learning Community
SABC	South African Broadcasting Corporation
SCCFS	Safe and Caring Child-Friendly Schools
SDG	Sustainable Development Goal
SGB	School Governing Body
SSE	School Self Evaluation
TCM	Training Centre Manager
TED	Teacher Education and Development
Ts and Cs	Terms and Conditions
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
USAF	Universal Service and Access Fund
UVS	<i>ukuFUNda virtual school</i>

GLOSSARY

Cost-effectiveness	Cost-effectiveness refers to whether the way in which the job was done represented the best value for money – i.e. was this the most effective way of achieving the project objectives with the available resources? This is how the OECD defines ‘efficiency’, which is a measure of ‘how economically resources/inputs (funds, expertise, time, etc.) are converted to results’. ¹
Effectiveness	Effectiveness is a measure of the ‘extent to which the development intervention’s objectives were achieved, or are expected to be achieved, taking into account their relative importance’. ² It is considered in relation to the intended effects as outlined in a theory of change and/or related logic model (theory of action) which was defined in the UVS ‘Results matrix’.
Efficiency	Efficiency refers either to timely and professional contributions from partners to fulfil their roles and responsibilities as agreed in the UVS partnership (i.e. ‘getting the job done professionally and timeously’), OR to the final product that is created working/operating as planned, with maximum speed, minimum downtime, etc. (i.e. ‘the final product operating smoothly and quickly’). See ‘cost-effectiveness’ as defined above, where the OECD definition of ‘efficiency’ was considered.
Five-number summary	The five-number summary is a descriptive statistic that provides information about the measure of spread of a set of observations. It consists of the five most important values: <ol style="list-style-type: none"> 1) the sample minimum (smallest observation); 2) the lower quartile or first quartile; 3) the median (middle value); 4) the upper quartile or third quartile; 5) the sample maximum (largest observation).
Independent evaluation	An evaluation carried out by entities and persons free of the control of those responsible for the design and implementation of the development intervention. ³
Lower quartile	The value one-quarter of the way through a list of values written in order.
M-learning affordances	Potential ways in which mobile technology can be used to enhance learning.
m-Learning configurations	Potential ways in which m-learning services are designed or intended for use by learners.
Median	The value in the middle of a list of values written in order
Partners	The individuals and/or organizations that collaborate to achieve mutually agreed upon objectives. ⁴
Participatory evaluation	Evaluation method in which representatives of agencies and stakeholders (including beneficiaries) work together in designing, carrying out and interpreting an evaluation. ⁵
Relevance	‘The extent to which the objectives of a development intervention are consistent with beneficiaries’ requirements, country needs, global priorities and partners’ and donors’ policies’. ⁶
Skewness	The measure of asymmetry of the probability distribution of a random variable

Summative evaluation	A study conducted at the end of an intervention (or a phase of that intervention) to determine the extent to which anticipated outcomes were produced. Summative evaluation is intended to provide information about the worth of the program. Related term: impact evaluation. ⁷
Sustainability	The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time. ⁸
Upper quartile	The value three-quarters of the way through a list of values written in order.

EXECUTIVE SUMMARY

Introduction

The *ukuFUNda virtual school* (or UVS) is an innovative m-learning service, conceptualized in 2013 and launched in September 2014 by a partnership comprising the South African Department of Basic Education, UNICEF, and the Reach Trust (formerly known as Mxit Reach). It was the DBE's first attempt to develop and mobile-learning portal. The UVS is a portal that uses a social-networking platform (Mxit) to provide access to learning resources and content, counselling and safety services and other value-added services and programmes via mobile technologies. The platform, hosted on a server making use of a SQL database, aggregates pre-existing learning and psycho-social applications ('apps'), but also new, bespoke apps developed specifically for the UVS. The UVS makes applications available to users through three views: a learner view, a teacher view, and a parent view.

The UVS is unique because it allows accessibility and support across 8,000 mobile devices (feature phones and smart phones), and reached remote areas where only 2G connectivity is available, thus incorporating a strong equity focus. It was initially intended to support secondary school learners only, but its focus extended to include support to teachers and parents as the project evolved.

The conceptual framework for this evaluation was informed by Strigel and Pouezevara's (2012) on m-learning affordances and m-learning configurations. The former refers to potential ways in which mobile technology can be used to enhance learning (accessibility, immediacy, individualization and intelligence). This was extended to include 'big data' (large and complex data sets collected from user information an activity), and context management (delivering content appropriate to the learner's goals, situation and resources). The latter refers to potential ways in which m-learning services are designed or intended for use (learning, kinetic, collaboration spectrums). Roberts, Spencer-Smith, Vänskä and Eskelinen (2015) expanded the m-learning configurations spectrums to include access, affordability and pedagogy spectrums as key characteristics of particular m-learning services. The expanded theoretical framework was used for this evaluation.

Evaluation framework

The scope of the evaluation was to review the implementation of UVS in the period September 2014 to December 2015. As such it was a summative evaluation of the first phase of the UVS. The purpose of the evaluation was to determine the effectiveness of the UVS and to learn lessons from the implementation experience of the UVS, in order to inform future mobile learning interventions of the DBE and UNICEF. The specific objectives of the evaluation were to:

- Establish if the service was implemented as planned;
- Verify the reach of the service amongst learners, educators, parents and officials (including teacher centre managers), as well as to ascertain which components are being actively used by which types of users;
- Evaluate the back-end system used to host the UVS platform and its sustainability; and
- Assess the cost-effectiveness of the virtual school programme and the potential sustainability of the proposed model.

The evaluation considered effectiveness as a measure of the 'extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance'. It was considered in relation to the intended effects as outlined in a theory of change and/or related logic model (theory of action) as defined in the UVS 'Results matrix'.

Four contextual factors need to be taken into account for this evaluation study:

1. The UVS was the DBE's first attempt to develop a mobile-learning portal through a partnership agreement;

2. Changes to the envisaged scope were made over time by mutual agreement between the partners;
3. Many decisions were made based on the desire of the project partners for large-scale access to the services; and
4. This intervention was undertaken in a rapidly changing technology environment.

Each of these points of elaborated upon in the main report.

Methods

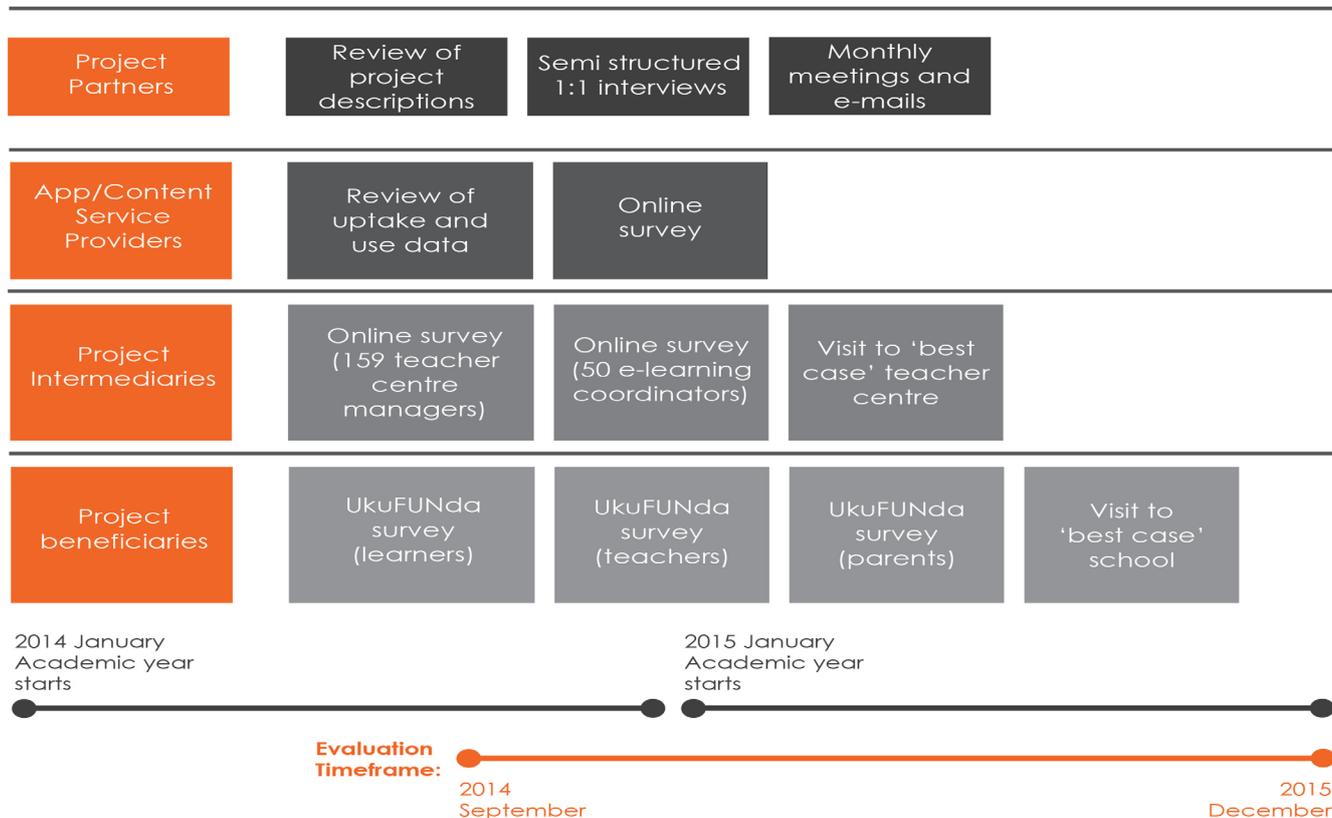
Four distinct stakeholder groups participated in the evaluation:

1. *Project partners*, which included representatives of the funding and implementation partners (UNICEF, DBE, and the Reach Trust).
2. *App/content service providers*, which comprised the managing directors or liaison persons at organizations that integrated their services into the UVS platform.
3. *Programme intermediaries*, which comprised provincial education department officials, particularly teacher centre managers and e-learning specialists, who were expected to encourage use of the UVS amongst teachers and learners.
4. *Programme beneficiaries*, which included teachers, learners, and parents who were expected to use the UVS.

The data collection process for each of the stakeholder groups is outlined in the figure below.

Figure 1 *The data collection processes for the UVS evaluation*

Methods



This evaluation drew on stakeholder perceptions and data on uptake and usage of the service by secondary school learners, teachers, and parents. A mixed-methods approach was adopted, drawing on both quantitative and qualitative research methods. The quantitative data included survey and uptake and usage data, while qualitative data was sourced from interviews and focus groups with stakeholders (including a case study school and teacher centre). A desktop review of primary documents was also conducted to provide a detailed project context and description. A case study school and a case study teacher centre were purposively selected to represent examples where there was evidence of uptake and use of UVS, and interviews and focus groups were held with beneficiaries at these sites.

Key findings and analysis

This section presents the key findings from the evaluation, detailed analysis of which is presented in the main report. A monitoring and evaluation framework was developed to govern implementation and impact of the UVS, while the project's oversight committee (comprising UNICEF, DBE, and The Reach Trust representatives) subsequently developed a Results Matrix in November, 2014. The 'Results Matrix' defined the following project expected outcome: *'Improved quality of teaching and learning through the development of virtual school mobile application that supports teacher and learners with education and psychosocial support material'*.

This overarching expected outcome was to be attained through three outputs:

Output 1: A virtual school mobile application that provides learners, teachers, and parents with quality educational tools is developed and deployed.

Output 2: Educators, learners and parents use virtual school.

Output 3: UVS is utilised for collecting and dissemination of strategic information.

Several applications were included in the UVS to contribute to achieving these objectives. However, there are differences between: (1) what was planned; (2) what was initially included; and (3) what was visible at the time of the evaluation. It must be noted that although the identities of the specific applications changed over time, the focus of the apps (viz. psycho/social and academic support) did not change.

The UVS mobile application

The UVS comprised of third-party applications which were brought together into a social networking platform (Mxit) and could be accessed from a common menu. Several third party service providers partnered with UVS to have their applications integrated into the UVS service¹. A Mxit 'Do-It-Yourself' (DIY) application named 'Mxit launch' is used to create, edit and review content. In addition, several bespoke applications were developed specifically for UVS. These included a school self-evaluation tool, a school nutrition app, and a communication tools for teachers, learners and parents; none of which were being used nor integrated into the functioning of the DBE during the period of the evaluation. Further, a UVS dashboard was created with the purpose of providing up-to-date uptake, usage and user demographic data but which, in reality, did not provide any usage data.

The UVS platform is hosted on a server, making use of a SQL database. User registrations are queried directly from this database. No user-friendly reporting and administrator interface had yet been developed to guide interaction with this underlying database.

M-learning affordances

Project partners were asked to provide feedback on what they felt were the m-learning affordances and configurations of the UVS.

¹ The educational tools included: CareerXplora; Everything Maths; Everything Science; FunDzal Magic tables; Mindset Learn Xtra; Periodic Table and QuizMax. The safety and wellness applications included Childline; Family Safety Center; LoveLife; Mac911; MobieG; Rape Crisis; Thuthuzela Care Centres (TCC); MGirls and MyChoma.

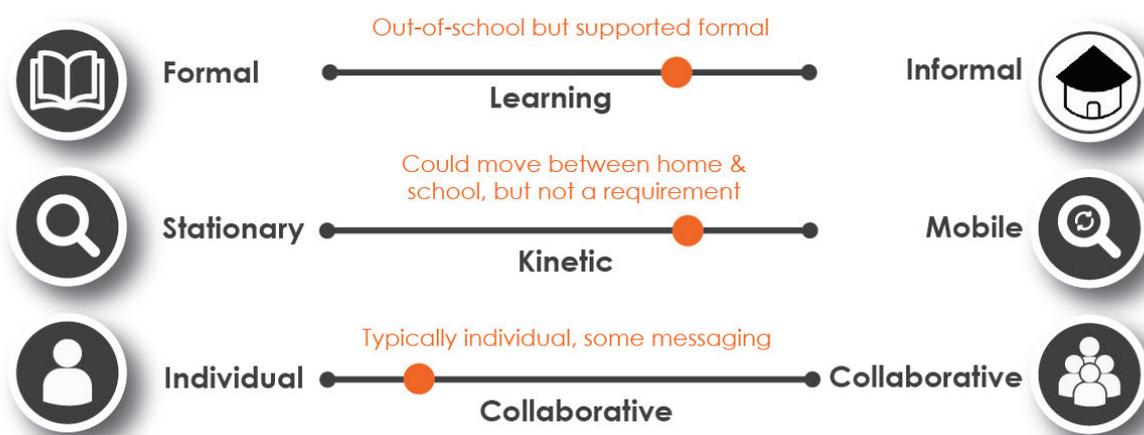
They were unanimous that the most important m-learning affordance was *accessibility*, in terms of which making learning resources and materials available to as many learners, teachers, and parents as possible was the main priority. The m-learning affordances of *big data* and *immediacy* were considered less of a priority by most project partners, although there was less consensus on these. The m-learning affordances of *individualization*, *intelligence*, and *context management* were ranked as the lowest priority by project partners. There was general acknowledgement that the UVS did not offer a personalized experience, but that bite-sized chunks of information were available. Context management was ‘not a priority’ and ‘not a major consideration in the design’.

M-learning configurations

Considering the m-learning configurations, the UVS was informal (used out-of-school) but supported formal learning (including both academic and psychosocial support) in terms of the *learning spectrum*. The service was towards the mobile end of the *kinetic spectrum* as the learners/parents/teachers could be moving while using the service (this movement was not a requirement for engaging with the service). In terms of the *collaborative spectrum*, the service was nearer to the individual end of the spectrum as individual learners/teachers/parents typically worked independently on the service. However, the UVS included some messaging and calendar functionality which would allow for collaboration, although this was not fully utilised at the time of the evaluation.

Figure 2 The UVS on the learning, kinetic and collaborative spectrums

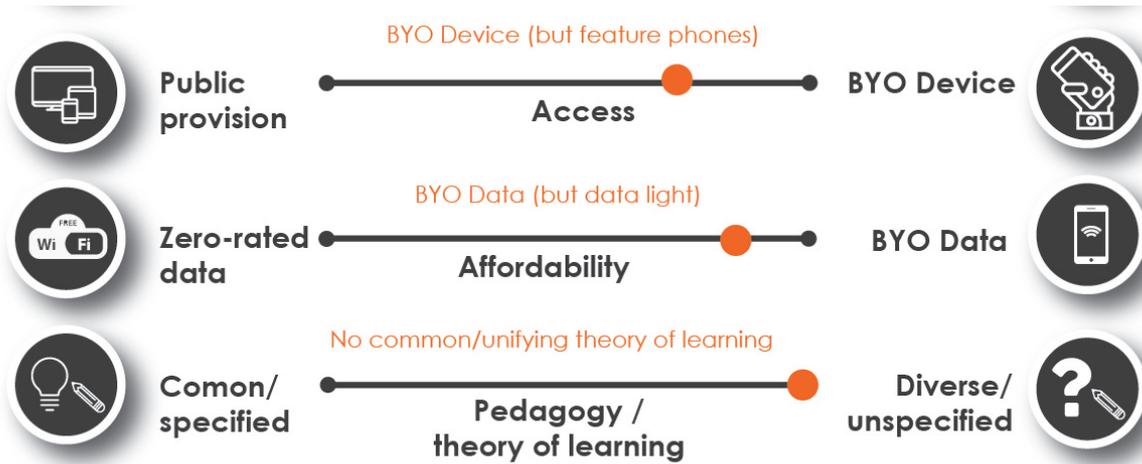
Key Findings: UVS M-Learning Configurations



In relation to the *access spectrum*, a BYOD approach was adopted. The UVS was designed to reach as many teachers, learners, and parents as possible within this approach and so it was decided to design for basic feature phones. Considering the *affordability spectrum*, there were no licensing or subscription costs for using the service. Users were expected to pay for their own data, but the design was deliberately restricted to text and some images to keep the UVS ‘data light’. The data relating to UVS was zero-rated only for one mobile operator (Cell C) as a result of broader agreement with Mxit.

Considering the *pedagogy spectrum* there was no common approach to pedagogy of a theory of learning as each application adopted their own approach. The UVS experience, however, prompted project partners to reflect critically on what they viewed as current trends within the DBE in relation to m-learning, e-learning, and pedagogy more broadly. UVS was seen as ‘disrupting’ the current approach to pedagogy within the DBE, although difficulties in changing DBE practice were also acknowledged. UVS was an attempt to try something new and different within the established bureaucracy.

Figure 3 The UVS on the access, affordability and pedagogy spectrums



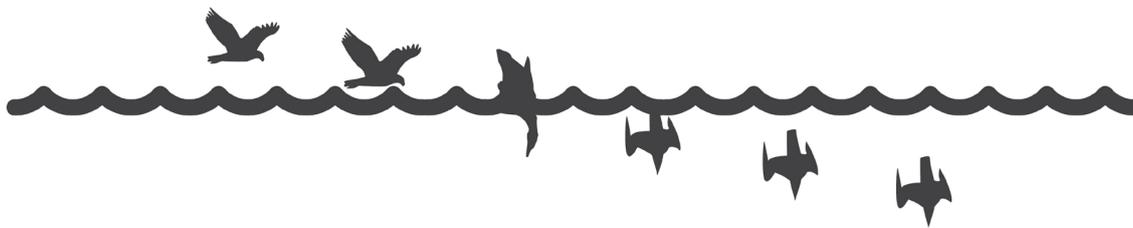
Uptake and use

Based on data measuring messages to and messages from the service for the evaluation period, 1,048,576 users interacted with the service in some way, sending and/or receiving at least one message on the service. Of these, 179,074 (17.1% of the total) individuals - 150,321 learners; 7,290 teachers; and 21,463 parents (from 8,809 different schools) - took the additional step of registering for the service during the evaluation period. The table below provides an indication of the usage of the service over the evaluation period.

Table 1 Categories of UVS users² (September 2014 to December 2015)

Category name	Total views and posts	Number of users	Percentage
Once-off skimmers	1	241,085	23.0%
Skimmers	2 to 10	401,480	38.3%
Duckers	11 to 100	324,613	31.0%
Novice divers	101 to 1,000	75,822	7.2%
Intermediate divers	1,001 to 10,000	4,275	0.4%
Master divers	10,001+	1,301	0.1%
	Total	1,048,576	100%

² The terms to categorize different levels of use (skimmers, duckers, and divers) were based on those proposed by Dr. Konstantin Mitgutsch (see <http://www.playfulsolutions.net/>):



Category name	Once-off Skimmers	Skimmers	Duckers	Novice Divers	Intermediate Divers	Master Divers	Totals
Total views and posts	1	2-10	11-100	101-1000	1,001-10,000	10,001+	
Number of users	241,085	401,480	324,613	75,822	4,275	1,301	1,048,576
Percentage	23%	38%	31%	7%	0.4%	0.1%	100%

In total, 1,048,576 users at least touched the service during the period under evaluation. Of those 807,491 users who had touched the service more than once (as measured by more than one message being sent/received), approximately 50% had sent/received 11 or fewer messages. **There was a small number of 1,301 users (0.16% of the total) with exceptionally high usage**, who sent/received more than 10,000 messages. There were almost 3.5 million sessions over the 16-month period, but a bounce rate of over 70%, which means that, in over two-thirds of the sessions, the user did not progress beyond the landing page.

Beneficiary feedback

Learners and teachers indicated a positive attitude towards the UVS. Learners' responses were, on the whole, slightly more positive than those of teachers. Learners at a case study school appreciated that the service provided them information to which they would otherwise not have had access. The following strengths were mentioned by members of at least three of the stakeholder groups:

- 1) The UVS was accessible on cheaper phones (feature phones) opening it to a wide audience.
- 2) The UVS was data-light and so using it was more affordable.
- 3) The UVS adopted a holistic approach, covering both psychosocial support and academic learning materials.

The project partners placed much hope in the teacher communication components, which were meant to link to communities of practice but ultimately failed to do so. Some respondents considered the dashboard to have potential in theory, but disappointment was expressed regarding how this worked in practice, because the data presented concerned only uptake data and did not give a sense of which content was being used or of patterns of usage over time.

The following issues and weaknesses were identified by at least three stakeholder groups.

- 1) The UVS needed to be accessed via Mxit, a declining platform.
- 2) It was reportedly not easy to download and use.
- 3) Once downloaded, the interface/navigation process was not user-friendly, involving too many steps and menus to locate specific services and apps.

- 4) Although the service was relatively affordable to use, it still required paid-for data, and it was observed that not everyone could afford data bundles.

There was general consensus amongst all stakeholders that the UVS should be changed so that it does not need to be accessed via Mxit.

Budget analysis

The total budgeted amount for the UVS was R12,049,000 which was to be split 40% UNICEF and 60% Reach Trust. This is the budget against which the Reach Trust made claims to UNICEF. As there were three additional expense claims (over and above the original UNICEF budget) the direct UNICEF contribution over the life of the project was R5,783,931.

It has not been possible to comment on actual expenditure on the line items in the budget, as the only financial data supplied (apart from travel expenses) re-state the budgeted amounts rather than actual expenses. However, given that reporting was capped in this way, actual expenditure on UVS is not known, and it can only be concluded that the UNICEF investments were more than expected.

Neither the actual Mxit/Reach Trust expenses nor the in-kind cost contributions of other high-level project implementers were tracked systematically against the budget line items in order to verify actual expenditure. This meant that evaluation analysis could only be conducted as an analysis of budgets and reported expenditure.

When considering costs, it is also appropriate to consider the costs borne by the beneficiaries for devices and for data. The UVS made use of a 'Bring Your Own Device' (BYOD) and 'Bring Your Own Data' model of access. For learners the replacement value of devices was calculated to be R864; with data use over 16 months reported to be R1,216.

Lessons learned

From this innovative environment and the various developments that unfolded within it over the period under review, several useful lessons have been learned:

Lesson 1: There is appetite for digital content and m-learning services across all groups

Lesson 2: The conceptualisation phase of programme design is critical to the success of an intervention

Lesson 3: BYO-Device approaches can be adopted for m-learning interventions targeting secondary school learners and teachers

Lesson 4: BYO-Data services exclude vulnerable audiences from public services

Lesson 5: Providing access to digital materials and services does not necessarily lead to use

Lesson 6: While social-networking platforms can be used to reach audiences (learners, teachers and parents), educational services require more than 'an audience' to be effective

Lesson 7: There are opportunities associated with using mobile applications to support particular educational functions, but this requires detailed testing and ongoing monitoring and management

Recommendations

Based on the discussion on findings in the main report, the following recommendations emerge:

Invest in the project conceptualisation phase

- 1) The Theory of Change developed should be specific about the target audience and focus of the initiative, ideally ensuring that this is kept tightly defined to increase the prospects of successful implementation.
- 2) Projects should have a detailed Logic Model against which the success or otherwise of the intervention can be measured, both internally (by the partners) and externally (by evaluators). This logic model should align with the theory of change, and include clearly defined indicators (against which future achievements can be measured).
- 3) The monitoring and evaluation partners should be brought on board early enough that they can be involved in this clarification phase.

Focus on the use case for education (not social-media trends)

- 4) Given the rapidly evolving nature of the ICT industry, app designs need to as far as possible be kept independent of potentially transient trends in technology use in broader society.

Design for scale, but pilot and invest in gathering user feedback to improve the design

- 5) Services should be piloted before being launched, to ensure that all technical bugs are overcome and the service works in a way that users find easy. An ongoing cycle of trial-implement-respond to user feedback should ideally be built into the design cycle.
- 6) Mechanisms to allow feedback from users should be designed into the service. Feedback is a key mechanism for educational improvement. If qualitative human feedback is enabled, project partners offering the service will require enough people to engage with the feedback meaningfully.

Drive uptake

- 7) Metrics for reporting on uptake should be agreed from the outset.
- 8) M-learning interventions require a detailed plan for activation, marketing, communication, and ongoing support to the target beneficiaries and intermediaries. This support may need to include both technical support (to assist with issues like problems accessing the service) and educational support (to make it clear what the benefits of the service are to beneficiaries and intermediaries).
- 9) Registration processes should be streamlined to make it quick and easy to register, especially initially, so that people are not deterred from the process.

Report on both uptake and usage data

- 10) Clear metrics for tracking uptake and use of e-learning and m-learning services should be agreed up front and incorporated into the design of those services, with analytics tools enabling real-time access to usage data and reports based on those metrics. These analytics should be set up in such a way that data about usage of the service can readily be isolated from usage of any overarching service in which it may be embedded.
- 11) Project management teams must monitor both uptake and usage on a monthly basis, and devise suitable strategies when there is low uptake and/or usage.

- 12) Programme implementers, intermediaries and beneficiaries at various levels ought to have access to uptake and usage data in real time. As such uptake and usage should be reported via an application backend that is accessible online
- 13) Careful consideration should be given to mechanisms to ensure that accurate data relating to the demographics of the users; the schools that they are located in and so on can be collected at registration without making the registration process unnecessarily burdensome.
- 14) All uptake and usage data collected should be regularly scrutinized to ensure that data is being collected correctly, particularly when new innovations or services are introduced that might create inaccuracies in data generation and collection.
- 15) If interventions set out to improve learning attainment, then clear, rigorous research designs and metrics for measuring shifts in attainment must be agreed from the outset.

Monitor project spending to improve interventions

- 16) Once planning documentation has been agreed, both quality assurance processes (monitoring and evaluation activities), and financial management decisions should be aligned to the agreed project framework.
- 17) Mechanisms to deal with non-delivery of agreed activities should be defined in contractual agreements, so that mitigating contractual process can be followed as and when the need arises.

Track and analyse the full actual costs of all partners

- 18) Before developing project budgets that focus on scaling up technological innovations in e-learning or m-learning, a period of piloting is important in which full costs of implementation are carefully tracked so that they can inform decisions on the relative cost-effectiveness of scaling up the innovation.
- 19) To the greatest extent possible, and particularly in a context where a project is based on partnerships between the public and private sector, the period of project piloting should focus on measuring actual costs incurred rather than fees typically charged in a commercial setting, as the latter can have a distorting effect when considering long-term cost effectiveness. For example, knowing the actual cost drivers behind an advertising fee charged per learner would help to determine whether or not the resultant conversion rate into use of the UVS reflected sufficient value for money to continue with that marketing strategy or rather divert those funds into alternative marketing strategies.
- 20) Linked to the above, the project management process should, to the greatest extent possible, enable regular review of project spending in order to provide a basis for future project and financial planning. Ideally, project management structures should be sufficiently flexible to ensure that monitoring data and formative evaluative inputs can enable shifts where appropriate in spending. For example, if there is low conversion of advertisements into use of the service compared to the apparent effectiveness of in-school engagement, re-direction of spending may yield more productive results. This flexibility is especially important during piloting phases of technological innovations, given the inherent uncertainty of what strategies are most likely to work successfully.
- 21) Where project partners are offering services that are non-core (for example, conducting surveys) these aspects of project implementation should be subject to normal procurement rules of agencies to ensure that financial comparisons between the services of different firms can be considered.
- 22) Ideally, budgets should be zero-based and derived from project activities rather than including line items for full-time staff. Such budgets make it easier to link resources (for example, time-on-task) to specific deliverables, thereby aligning the level of effort required to achievement of expected project results. Such budgeting approaches might draw on the activity-based budgeting approach that UNICEF has already introduced into its project approval process.

Concluding remarks

The *UVS* focused on equity/redress and targeted rural and poorly resourced beneficiaries by choosing a platform (Mxit) that was affordable (cost-effective) both in terms of data usage and accessibility on lower-end phones (feature phones), not just smartphones. The partnership agreement was intended to create an innovative space in which exploration and experimentation could occur. The development of the service was innovative; perhaps even the first example in the world of a mobile-based virtual school that collates apps in the way that the *UVS* did. In addition, it adopted a holistic approach covering both psychosocial support and academic learning materials. In the context of high levels of poverty in South Africa, experimentation with this type of affordable technology is laudable.

The *UVS* has provided a tremendously fertile environment for learning important lessons about m-learning at a time when the concept was relatively new and very little was known globally about what the most effective strategies for harnessing mobile technologies in public schooling systems might be. Given the issues outlined in this report (and most particularly the radically changing use patterns of Mxit and the lessons that were learned about user preferences, marketing and usage patterns, and so on), it seems most important to ensure that any future design is informed, from first principles, by the lessons learned by the *UVS*. Given that the technological environment in South Africa continues to transform very rapidly, it seems appropriate to commence future planning with re-development of a new Theory of Change that draw on the lessons documented in this report. Once this is complete, it may be that there is merit in continuing with 'more-of-the-same' or 'tweaking the *UVS*' or that project partners (and particularly the DBE and UNICEF as the lead educational partners) identify a requirement for a more comprehensive overhaul. This can only be determined through a systematic and structured planning process that builds on the lessons of the *UVS*.

CHAPTER 1: INTRODUCTION

Between 2013 and 2015, UNICEF partnered with the Department of Basic Education (DBE) and Mxit Reach (known as The Reach Trust since September 2015) to create a mobile platform that could support teaching and learning in South African secondary schools. This culminated in the launch of the *ukuFUNda virtual school (UVS)* by the three parties in September, 2014. The UVS ‘service’ is a collation (currently) of around 20 academic, social, wellness, and safety apps that are delivered via Mxit.

This evaluation reviewed the implementation of the UVS, drawing on stakeholder perceptions and data on uptake and use of the service by secondary school learners, teachers, parents, and educational intermediaries³. **It is important to note that this evaluation did not seek to measure impact in relation to learning outcomes, because, during the exploratory and innovation stage of UVS (which is the period under review), it was not expected that there would be evidence of changes in learning outcomes.**

The **scope** of the evaluation was to establish the effectiveness, efficiency, relevance and sustainability of the UVS from September, 2014 to December, 2015.

The **purpose** of the evaluation was to determine the effectiveness of the UVS and to learn lessons from the implementation experience of the UVS, in order to inform future mobile learning interventions of the DBE and UNICEF. **It must be noted that the evaluation was not intended to measure impact on any of the beneficiary groups.** Rather, effectiveness was considered as a measure of the ‘extent to which the development intervention’s objectives were achieved, or are expected to be achieved, taking into account their relative importance’. It was considered in relation to the intended effects as outlined in a theory of change and/or related logic model (theory of action) as defined in the UVS ‘Results matrix’.

Its **objectives** were to:

- Establish if the service was implemented as planned;
- Verify the reach of the service amongst learners, educators, parents and officials (including teacher centre managers), as well as to ascertain which components are being actively used by which types of users;
- Evaluate the back-end system used to host the UVS platform and its sustainability; and
- Assess the cost-effectiveness of the virtual school programme and the potential sustainability of the proposed model.

The evaluation **findings** will be used by DBE and UNICEF to determine the utility of the platform and how best to take it forward.

The next chapter (Chapter 2) presents the evaluation methodology which is followed by a document review (in Chapter 3) of the key policy frameworks which were in place for the UVS at national and international level. This literature review is presented as part of the report and therefore not reflected upfront. A description of the UVS is presented in Chapter 4 which is followed by the evaluation findings in Chapter 5. The report concludes with Chapter 6, with discussion of, and lessons emerging from, the findings.

3 The term ‘educational intermediaries’ is used to refer to those officials within the South African education system whose role it is to promote use of DBE-endorsed services such as the UVS.

CHAPTER 2: EVALUATION METHODOLOGY

This report presents the results of an external implementation evaluation of the UVS from September, 2014 to December, 2015. Although the initial intention was for the evaluation to be formative (and that its findings would inform future directions), it commenced very late. Consequently, the evaluation instead constitutes a summative evaluation of the first phase of the UVS. Because it was commissioned only after conclusion of the first phase, some data gathering on key issues such as costs and expenditure was difficult to do retrospectively.

The evaluation was conducted by an outside entity (Kelello Consulting) not linked to the funders and/or implementing agencies. It is an implementation evaluation, which means that it is an 'evaluation intended to improve performance, most often conducted during the implementation phase of projects or programs' (OECD Development Assistance Committee, 2002).

Such evaluations tend to be participatory evaluations, because stakeholders involved in the project are given an opportunity to provide feedback (Babbie and Mouton, 2001). This evaluation was no exception: we consulted various stakeholder groups in order to distil key lessons and experiences from different perspectives, which have then been used to inform the future development and implementation of the UVS (and, potentially, other similar online services).

Evaluation purpose

The purpose of the evaluation was to distil key lessons that could be used to inform future implementation, scale-up and the sustainability of this important education innovation. As such, the research questions focus on this purpose in relation to five focus areas: context; effectiveness; efficiency/cost effectiveness; relevance; and sustainability.

Key evaluation concepts

This evaluation has considered both m-learning 'affordances' (the potential ways in which mobile technology can be used to enhance learning) and m-learning 'configurations' (the potential ways in which m-learning services are designed or intended for use by learners).

Uptake refers to the number of users who register for a service, while usage refers to how frequently users visit and interact with the service once they are registered. Both indicators are useful and have been drawn upon in this implementation evaluation study. Uptake provides an indication of the reach of a service. It is reported in terms of total users, as well as disaggregated according to type of user (learner, teacher, and parent).

Usage data is defined in relation to data transfer between a user and the service, which is most commonly reported in MegaBytes (MB) and can be disaggregated into views and posts. While views provide an indication of information received by the user (data pushed to the end-user), posts indicate some level of interaction with the service with regard to requests for information or responses to questions (data pulled from the service by the end-user). Usage was considered for a defined period: from official start date 12 September, 2014 to the end of the calendar and academic year on 31 December, 2015.

Ethical considerations

The evaluation followed well-established ethical guidelines on the participation of children and other respondents. In particular, the principles of voluntary, informed consent for research participation were applied, in that all participants in the study were fully informed about the nature and purpose of the research and their requested involvement. Only participants who gave their written or verbal consent (documented) were included in the research.

Evaluation stakeholder groups

There are four distinct stakeholder groups relevant to this evaluation:

- 1) *Project partners*, which included representatives of implementation partners, comprising UNICEF, DBE, and the Reach Trust.
- 2) *App/content service providers*, which comprises the managing directors or liaison people at organizations that integrated their services into the *ukuFUNda* platform.
- 3) *Programme intermediaries*, which comprises the DBE officials, particularly teacher centre managers, e-learning specialists, and district officials, who were expected to encourage use of the UVS amongst teachers and learners.
- 4) *Programme beneficiaries*, which includes teachers, learners, and parents who were expected to use the UVS.

Data collection processes

A mixed-methods approach was adopted, drawing on both quantitative and qualitative research methods. The quantitative methods included survey data and uptake and usage data, while qualitative data was sourced from interviews and focus groups with stakeholders. Such a mixed-methods approach is commonly accepted as an ideal approach for an evaluation as it allows for the triangulation of data sources (Cresswell and Clark, 2007).

A desktop review of primary documents that informed the UVS was conducted to provide a detailed project context and description. Only those documents that existed prior to the launch of the school (i.e. prior to September 2014), were consulted. Addendum B contains a complete list of primary documents reviewed.

Survey data was primarily obtained from two sources: online questionnaires administered via SurveyMonkey (links to which were sent by email to app/content service providers and intermediaries who were trained in, have used, or have created apps for, the *ukuFUNda* platform), and Mxit-based questionnaires targeting project beneficiaries. Both of these are examples of electronic surveys, a relatively recent development in data collection which has a number of advantages over paper surveys (Boyer et al., 2002), and which does not appear to result in a reduction of data quality (Nicholls, Baker, and Martin, 1997). Electronic surveys do have certain limitations, as listed by Wiersma (2011). These include potentially limited coverage (due to a lack of internet access amongst respondents), a lack of a sampling frame, low response rates (typically below 30%, and sometimes well below that figure), the difficulty of preventing multiple responses from one individual, and the fact that those who answer such questionnaires tend to have strong views on the issue being researched.

However, use of electronic surveys also has a number of advantages. These include the ease and low cost of distribution to potentially large numbers of respondents in a short period, which is very useful when, as in this case, an evaluation is constrained by budgetary and implementation timeframes. Also, considering the stakeholder group of beneficiaries, online surveys constitute the only logistically feasible way of reaching the target populations. They also have a number of practical benefits, such as their ability to use skip logic, provide drop-down selection menus, and require all questions to be answered before the questionnaire can be continued or closed.

Some potential limitations were overcome in this evaluation's use of online surveys. For example, the difficulty of preventing multiple responses from one individual was largely overcome by ensuring that, in the case of the email invitations to surveys, each respondent was given a unique identifier that could only be used once, while, in the case of the Mxit-based surveys, only one response per registered user was permitted.

To ensure that the internal reliability of questionnaire responses was high, alternate forms of the same question were provided in the same questionnaire (Gustat & Xiong, 2012). Any responses that contained a contradiction in the responses to the two versions of the question were excluded from analysis, as the contradiction indicated that it was highly likely that the respondent was either making up responses randomly and/or was not paying close attention to

what was being asked.

Feedback received from these electronic surveys cannot necessarily be considered representative of the entire population of partners, intermediaries, and beneficiaries, but rather represents the views of those who are highly motivated to respond to such a survey and are on the *ukuFUNda* platform frequently (i.e. recurrent users). As such, the survey data was not considered representative of the total targeted population, but only of users who were motivated enough to respond to a survey embedded in the platform.

To ensure that data collected was valid, the largely quantitative data collected through questionnaires was supplemented by qualitative data, collected through visits to one case study teachers' centre and one case study school. These cases were selected through 'purposive sampling' (a type of non-probability sampling, where the choice of the sample is based on evaluator judgement and the purpose of the study) (Babbie & Mouton, 2001). This is common in qualitative research, with Palys (2008) stating 'purposive sampling is virtually synonymous with qualitative research' (p. 697).

Two main types of purposive sampling were used in this evaluation. First, stakeholder sampling was used to select major stakeholders involved in designing, administering, and receiving the service for in-depth engagement. As Palys (2008) says, this 'is a strategy that is particularly useful in the context of evaluation research and policy analysis' (p. 697). Stakeholder sampling was used to choose, for example, which project partners to interview. Second, purposive sampling was used to select each case study of the teachers' centres and the school, which were chosen as 'best case' examples of high-levels of engagement with the *ukuFUNda* platform.

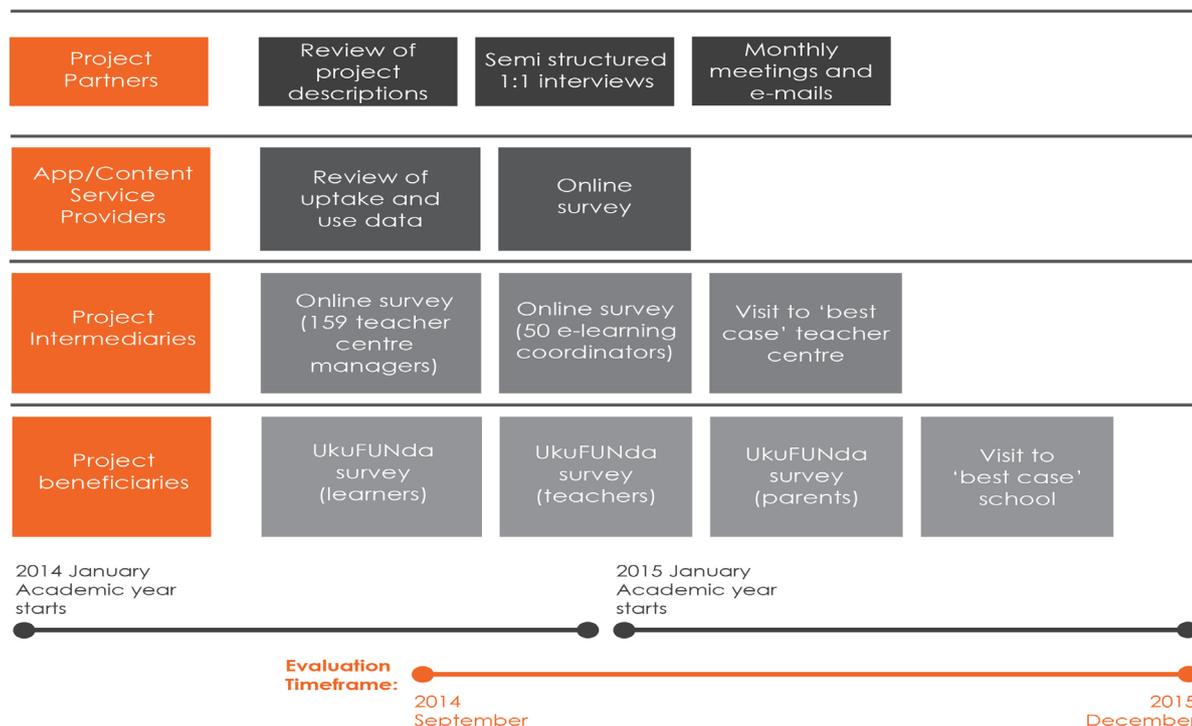
Finally, dashboard and back-end data provided by the Reach Trust were described and analysed so as to quantify the uptake and use of the applications within the *ukuFUNda virtual school*. Progress and emerging findings relating to the above were communicated and discussed with the oversight committee through meetings, about once every six weeks.

Methods used for each stakeholder group

As an overview, the following data collection methods were used for different stakeholder groups:

Figure 4 *Data collection methods for each stakeholder group*

Methods



Project Partners

Semi-structured 1:1 interviews with project partners focused on five areas: context, effectiveness, efficiency/cost effectiveness, relevance, and sustainability. In most cases, 1:1 semi structured interviews were held, relating to the costs and financial contributions from each implementing partner. The following interviews were completed:

- 1) Two DBE representatives (Director and Assistant Director for LTSM⁴, policy development and innovation);
- 2) Four UNICEF representatives (Education Specialist; Financial Manager; Monitoring and Evaluation specialist; and UNICEF technical support to DBE on ICT and teacher development); and
- 3) Two Reach Trust representatives (CEO and project manager).

It should be noted that a number of representatives of the project partners currently in position were not in place when the *ukuFUNda virtual school* was conceptualised. These include, for example, both the UNICEF and DBE leads in the oversight committee. This may have resulted in loss of some institutional knowledge, and time lags and gaps in project management.

An additional e-mail survey was distributed to seven additional high-ranking DBE and UNICEF officials to solicit feedback regarding their initial perceptions of intent and subsequent changes to the service design. Feedback was received from three of the seven key participants:

- 1) One from UNICEF: the former UNICEF SA Education Specialist; and
- 2) Two from DBE: the Acting Chief Director: Education Human Resource Development; and the Acting Director: Educator Performance Management and Whole School Evaluation

App/content service providers

An online questionnaire was developed for app/content service providers. A list of 13 service providers was provided by The Reach Trust CEO. All were contacted to complete the online questionnaire, and seven responses were obtained. The respondents were mixed, ranging from Executive Directors to Product Managers and Content Developers.

Project intermediaries

Data was collected from intermediaries in two ways, first, through the administration of a survey, and, second, through a focus group session held at a Teacher Centre. Online questionnaires (using Survey Monkey) were developed for Teacher Centre Managers (TCMs) who participated in the UVS training and e-learning coordinators (ELCs) who participated in the UVS training. The following responses were obtained from the teacher centre manager and e-learning coordinator surveys:

Table 2 *Intermediaries survey invites and responses*

Target group	# invitations emailed	# responses (full/partial)	% response rate
Teacher centre managers	143	49 (44/5)	32.5 %
e-learning coordinators	55	20 (18/2)	34.5 %

The response rate was calculated as follows: . Thus, for both groups, the response rate was around one-third of the total invitation list. This is satisfactory, though slightly disappointing, considering the brevity of the survey and the fact that all these officials had been trained in use of the UVS.

Teacher centre managers and e-learning coordinators were sent email invitations to complete a short three-minute online questionnaire. The survey was open for 27 days in both cases, with an original invitation plus three reminders being sent in that time. Since the questions asked of each group were almost identical, analysis of responses was completed for both groups together (though with separate graphs). As in any survey of this type, it is likely that a higher proportion of responding officials are more motivated and interested in their job and in e-learning than might be typical of the entire population. Responses might therefore be positively inclined towards the UVS as a consequence.

Project beneficiaries

Short questionnaires were designed and administered to the UVS target learners, teachers, and parents. Since response rates were low, this was replicated within the population of Mxit learners (who may not have used the *ukuFUNda* service, and so would be considered non-users). A small incentive (a lucky draw of airtime) was offered for completing the survey. The numbers of members of each beneficiary group who (at least) began to complete a short three-minute Mxit based survey are as follows:

- Learners: 92
- Teachers: 30
- Parents: 56

Of these, two learner surveys and six teacher surveys had to be excluded since they failed to pick up the 'trick' question in the Likert scale.⁵ This meant that the final numbers of surveys analysed were as follows:

- Learners: 90
- Teachers: 24
- Parents: 56

Not everyone who started a survey completed it, but data from partially completed surveys was included in the analysis.

The number of responses received to these surveys, across all beneficiary groups, was low considering how short the surveys were, how long they were open for, and the fact that incentives were offered for their completion. Possibly explanations for this might include: dwindling usage of the UVS over the life of the project; time and data required to complete the survey, both of which may have been in short supply for those on the service; and a possible aversion amongst users to respond to surveys.

As part of the research into the views of beneficiaries towards the UVS, a teachers' centre was visited. It proved to be difficult to find a suitable teachers' centre to visit. The first three cases selected (purposely selected as having registered learners and teachers) were contacted telephonically to arrange a visit, but the Teacher Centre Manager (TCM) claimed either not to be aware of *ukuFUNda* or indicated that nobody at that centre was using it and therefore a visit would not be useful. On the fourth attempt, a suitable teachers' centre was found, and visited. A focus group was then held with four education department officials: one TCM and three ELCs. Two instruments were created: one set of questions for teachers' centre users and one for non-users.

In addition, a high school was visited. Again, it proved difficult to find a suitable school to visit, as principals at the first three schools selected (purposefully from a list of schools with high numbers of registered users) claimed either not to be aware of the virtual school and/or were uncooperative in accepting a visit from the evaluators when contacted telephonically. This might have been because, while principal awareness of the UVS was not a prerequisite for learner uptake and use of the service, his/her research permission was required to gain access to the learners and teachers. Consequently, a school that had been visited by the Reach Trust team as part of the roll-out of the UVS service was

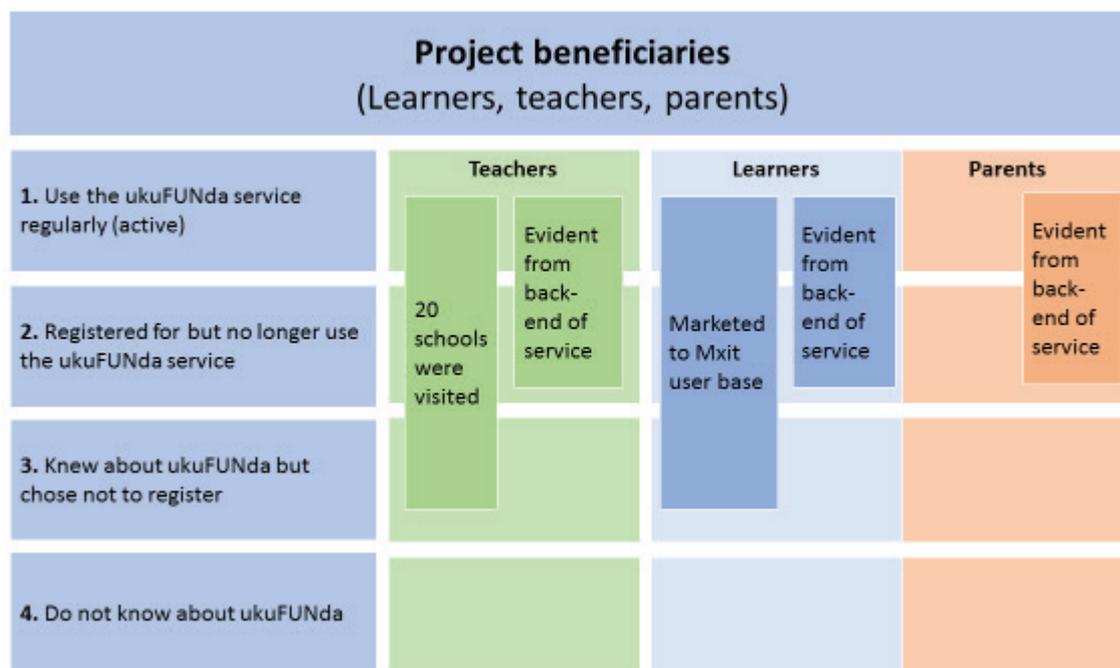
5 The first Likert-style question asked the respondent to respond to the statement 'The UVS is a fantastic resource'. A little lower down the statement they needed to respond to was 'The UVS is a terrible resource'. Any logic failure in answering these two questions (e.g. answering 'agree' for both) meant that the responses to the whole user's survey were rejected for the purposes of this analysis.

contacted and agreed to the visit. This was a Quintile 1 secondary school, one of the most populous in the country, located in deep rural Eastern Cape. Four focus groups were held during the visit: learner users; learner non-users; teacher users; and teacher non-users. Selection of learners and teachers for each of these groups was made by the contact person (the deputy principal), who was given clear instructions as to the criteria for selection⁶. Four instruments were created for the visit, namely sets of questions for learner users, learner non-users, teacher users, and teacher non-users.

Data analysis

The figure below depicts a framework for considering the uptake and usage of the three different types of beneficiaries.

Figure 5 Framework showing project beneficiary groups and their potential awareness of the UVS



The beneficiaries reached through direct marketing processes are shown by the boxes with a darker shade (e.g. the box for teachers stating '20 schools were visited'). The evaluation can only draw feedback from beneficiaries registered in the service and those contacted via direct marketing.

Data pertaining to uptake and use was analysed by using five point summaries to reflect the minimum, lower quartile, median, upper quartile, and maximum values for each metric. Uptake was analysed in relation to the total possible target population of learners, teachers, and parents at FET level in South African schools.

To generate totals for each beneficiary group, data from the latest available DBE statistics (for 2013) were perused. According to these, the total number of learners in Grades 8-12 in 2013 was 4,593,497 (DBE, 2013). The number of high school teachers was not provided, but the total number of all teachers was (425,023). By applying a learner: educator ratio (LER) of 29.4 across all grades, it can be extrapolated that the estimated total of high school teachers was 156,241. The number of parents/primary carers per learner was assumed to be 1:1, in order to take into account the reality that some families are single parents and that, in many families, only one parent is directly engaged in school-related support and activities.

⁶ These criteria included being willing and able to comment on the ukuFUNda virtual school, ideally in English (although translation was possible)

The following total target population figures were therefore applied to analyse uptake data:

Table 3 *Defining the target population*

Targeted group	Total population
Secondary school learners (Grades 8-12)	4,593,497
Secondary school teachers (Grades 8-12)	156,241
Targeted parents of FET learners	4,593,497

Comparisons with other m-learning services

This implementation evaluation will consider both m-learning affordances (the potential ways in which mobile technology can be used to enhance learning) and m-learning configurations (the potential ways in which m-learning services are designed or intended for use by learners). We briefly describe each concept in turn, with reference to the literature informing them.

Strigel & Pouezevara (2012) – who located their work within developing country contexts - describe four m-learning affordances: *accessibility* (access to learning opportunities, reference materials, experts/mentors, other learners); *immediacy* (on-demand learning, real-time communication and data sharing, situated learning); *individualization* (bite-size learning on familiar devices; promotion of active learning and a more personalized experience); and *intelligence* (advanced features making learning richer through context-aware features, data capture, multimedia).

Considering the global context of m-learning; there are also two additional affordances worth foregrounding: context management; and big data predictive analytics. Whilst these trends tend to be reported in developed world contexts; we consider these affordances pertinent to the UVS offerings; as if these are found not to be harnessed currently, they may suggest potential future directions for the service. We therefore describe each of these affordances in turn.

Key to m-learning affordances is *context management* or *context awareness* (Raxler & Kukulska, 2016). Context management is described by Lonsdale, Baber, Sharples and Arvantis et al (2004) as ‘a key sub-system that delivers content appropriate to the learner’s goals, situation and resources’. This is in response to the observation that ‘people on the move need information relevant to their location and immediate needs’ (Lonsdale et al. 2004, p.79).

Further, in the context of a focus of professionalising teachers and the monitoring, evaluation and support of intermediaries (such as district officials), the importance of the combination of *‘big data’ and predictive analytics* emerges as a key sub-element of the intelligence affordance. By way of example, Fenwick & Edwards(2016) outline the implications that these technology trends have on education professionals and what learners ought to be sensitised to for their participation in this digital world. These affordances help to codify the ways in which m-learning services may contribute to enhancing teaching and learning.

M-Learning Affordances



Accessibility

Access to learning opportunities, reference materials, experts/mentors, other learners



Immediacy

On-demand learning, real-time communication and data sharing, situated learning



Individualization

Bite-size learning on familiar devices; promotion of active learning and a more personalized experience



Intelligence

Advanced features making learning richer through context-aware features, data capture, multimedia.

Strigel and Pouezevara (2012)



Big data analytics

Large and complex data sets collected from user information and activity



Context management

Delivering content appropriate to the learner's goals, situation and resources

Roberts and Spencer-Smith (forthcoming)

Strigel & Pouezevara (2012) also identify variations in mobile learning configurations: a *learning spectrum* which ranges from formal (in class in school) to informal (out-of-school but formal learning, and/or informal learning for pleasure or entertainment); a *kinetic spectrum* which ranges from the learners being stationary to being mobile; and a *collaborative spectrum* from individual to collaborative. In relation to the South African m-learning research, Roberts, Spencer-Smith, Vänskä and Eskelinen (2015) make use of these m-learning configurations to classify the Nokia mobile mathematics service. This provides a useful local example to illustrate the way in which this m-learning configurations framework has been applied previously:

This [Nokia Mobile mathematics] mobile mathematics service was informal (used out-of-school) but supported formal learning (school mathematics) in terms of the learning spectrum ...The service was towards the mobile end of the kinetic spectrum as the service could be used while the learners ...[could be] moving while using the service, although this movement was not a requirement for engaging with the service. Finally, in terms of the collaborative spectrum, the service was nearer to the individual end of the spectrum... Individual learners typically worked independently on the service. However, the service included a limited collaborative aspect in that the learners' points (attainment and activity levels) were visible to each other in a community of mathematics learners, and learners could send messages to other learners from within the service. (Roberts, Spencer-Smith G, Vänskä, & S, 2015)

Roberts et al. (2015) argue further that two additional spectra ought to be added to the m-learning configuration framework: an 'access and affordability' and a 'mathematical pedagogy' spectrum. They motivated for and explained the

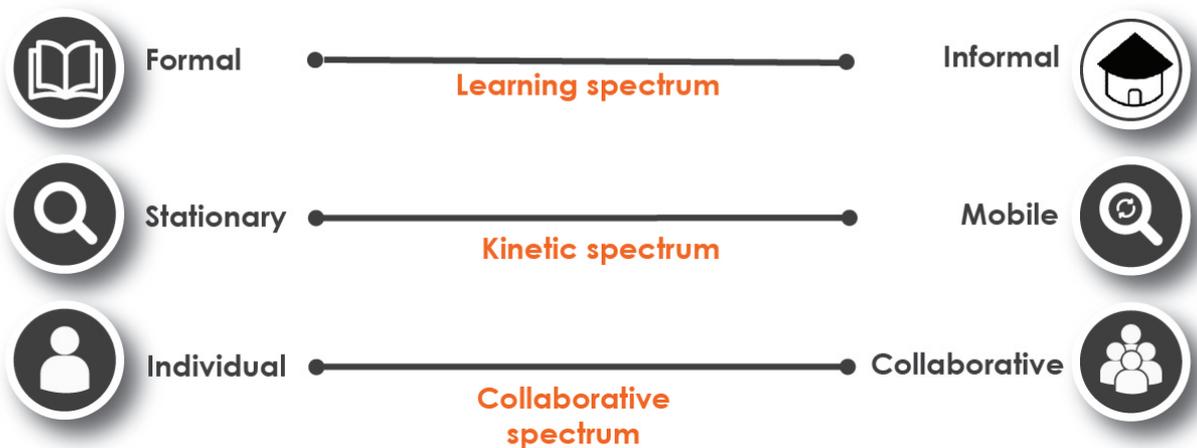
former spectrum (access and affordability) as follows:

In the resource-constrained context of South Africa, where consideration of m-learning interventions should focus on redress and equity; we consider this spectrum to be a fundamental consideration. We think that this ranges from free public access to suitable devices and free broadband data on one end, to Bring Your Own Device (BYOD) access models and private individual data contracts for broadband data on the other. Subsidised data (by government and or operators) and public investments into improved access to mobile devices fall somewhere on this spectrum. (Roberts et al., 2015)

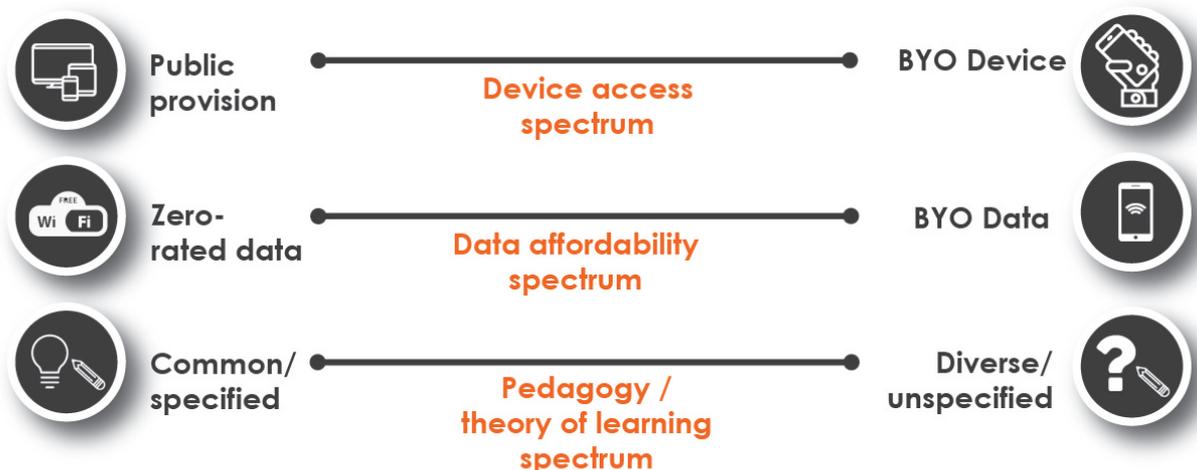
These arguments are made with specific reference to South Africa, and as the UVS is located in this context, the access and affordability spectrum is a relevant to this evaluation. The Roberts et al. (2015) study pertained directly to a mathematics m-learning service, while the UVS cuts across both a range of academic subjects and learner safety and wellness. As such the 'mathematical pedagogy' spectrum is not relevant, although articulated approaches to pedagogy more broadly and the presence or absence of a unifying approach to learning across the individual applications within the service would be of interest.

Figure 7 Theoretical framework: M-Learning configurations

M-Learning Configurations



Strigel and Pouzevara (2012)



Roberts, Spencer-Smith, Vänskä and Eskelinen (2015)

Where evaluative judgments are made with regard to uptake, usage, and tracking of effectiveness, UVS was compared with the *Microsoft Math (South Africa)* service which has been the focus of numerous evaluation reports, the findings of which have been published or shared in the public academic domain (Roberts and Vanska, 2011; Roberts et al., 2015; Roberts, 2016). Kelello Consulting (and, prior to this, Nicky Roberts and Neil Butcher of Neil Butcher & Associates) undertook evaluation studies of *Microsoft Math*, while Kelello Consulting subsequently project-managed the development of the mathematical content. As a result, references to the *Microsoft Math* service are to published work by the authors of this report. Kelello Consulting flagged a concern to UVS project partners regarding potential bias due to the evaluators' close engagement with the *Microsoft Math* service. It was agreed that, in the absence of other comparative data available in the public domain, comparisons to *Microsoft Math* would still be of value. We have therefore consulted published research available in the academic domain to draw comparisons between UVS and *Microsoft Math*.

Microsoft Math (<https://math.microsoft.com>), launched as *Nokia Mobile Mathematics* in 2008 but rebranded in mid-2014, is a free mobi-site for use primarily on smartphones and other mobile devices (such as tablets), designed in South Africa to support Grade 10, 11, and 12 Mathematics. There is also a downloadable app for Windows phones only. This service targets only one phase (Further Education and Training – Grades 10-12) and one subject (mathematics, for which there is a target population of approximately 1.5 million learners).

Unlike the UVS, *Microsoft Math* is not a portal to multiple applications, but a single application. *Microsoft Math* is a targeted service for a specific audience and subject area, where investments were made in instructional design, content development, ongoing research, and evaluation processes. It was not an aggregation of existing 'free' learning resources. In addition, it requires more structured engagement from users (through the answering of Mathematics questions) than the UVS, where users can simply browse in an unstructured fashion. The main similarities are that both services target South African secondary school learners (in mainly township and rural environments) and that both were developed in collaboration with government departments. In the case of *Microsoft Math*, relationships were established with the DBE, as well as the Department of Science and Technology (DST), while for UVS partnerships were established between the DBE and UNICEF.

CHAPTER 3: PLACING UVS IN CONTEXT

The *ukuFUNda virtual school* was an innovative m-learning service, conceptualized in 2013 and launched in September 2014 by a partnership comprising the DBE, UNICEF and Mxit Reach (the last-named being the implementing partner). The UVS is a portal or platform that uses mobile technology (in particular, Mxit) to provide access to learning resources and content, counselling and safety services and other value-added services and programmes. The platform aggregated pre-existing learning and psycho-social applications ('apps'), but also new, bespoke apps developed specifically for the UVS.

UkuFUNda was unique because at the time of its conceptualisation (2013) it allowed accessibility and support across 8,000 mobile devices (feature phones and smart phones), and reached remote areas where only 2G connectivity was available, thus incorporating a strong equity focus. It was initially intended to support secondary school learners only, but its focus extended to include support to secondary school teachers and parents of secondary school learners.

Before describing in greater detail the scope of *ukuFUNda* and how it worked, it is first useful to place it into a broader context. The *ukuFUNda virtual school* was implemented within the context of both the global (United Nations) and local (South African Department of Basic Education) policy frameworks. This policy context is important to situate the evaluation within its broader international context in relation to education and mobile learning.

The United Nations' millennium development goals

The United Nations' Millennium Development Goals (MDGs), with their ambitious targets for 2015, helped to galvanize countries and development institutions around the world to pursue a common agenda to meet the needs of the world's poorest people. The MDGs included two pertinent goals related to education and information and communication technologies, namely 'Goal 2: Achieve universal primary education' and 'Goal 8: Develop a global partnership for development'.

MDG Goal 2 established education as a key priority for global social transformation, while MDG Goal 8 aimed to galvanize a global partnership between governments, the private sector, and development agencies. It also included targeted interventions relating to new technologies through the following sub-goal: 'in cooperation with the private sector, make available benefits of new technologies, especially information and communications'.

Six 'Education For All' (EFA) goals were internationally agreed in the Dakar Framework for Action (World Education Forum, Senegal 2000), of which two are of particular relevance:

- Goal 3: 'Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes'.
- Goal 6: 'Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills'.

The UVS was developed within this global development framework and focuses on the education sector, making use of mobile technologies.

The UVS was initially developed under the global framework of the MDGs. The MDGs were subsequently revised and updated in 2015 for another 15-year period, as well as being renamed the Sustainable Development Goals (SDGs). At least two changes to this global framework are pertinent to this evaluation. First, education remains a priority area, although the focus on universal primary education has shifted to educational quality and inclusion at all levels of education with SDG Goal 4, which is 'ensure inclusive and quality education for all and promote lifelong learning'. The Qingdao Declaration (May 2015) was written to complement this goal, and to highlight the value proposition for the integration of digital technologies into education (Shafika Isaacs, personal communication, 28th May 2016).

Second, what was previously a general commitment to a global partnership for development has been outlined in more detail with the inclusion of several industry-specific goals. Amongst these is SDG Goal 9, which is 'build resilient infrastructure, promote sustainable industrialization and foster innovation'. This also has a relevant sub-goal to 'significantly increase access to information and communications technology (ICT)'. Technology and ICT in particular, also feature in the final SDG Goal 17: 'revitalise the global partnership for sustainable development'. For the MDGs, ICT was more peripheral. The use of ICT and its implicit role in contributing to increasing both educational quality and inclusion is now more central. The UVS was conceptualized within this context of a global commitment to improving education through innovation, making use of ICT.

UNICEF's priority on using innovation to improve learning outcomes

At the time of developing UVS, significant focus was being placed on the innovative possibilities created by wide-scale access to and use of mobile devices. UNICEF's focus on UVS was informed by the overarching education priorities, amongst others, of expanding access, addressing quality and equity, encouraging innovative approaches to realizing these goals, building synergies, harnessing the frontiers of efficiencies afforded by technology, and supporting national priorities. These are articulated in the UNICEF Country Programme Document for the period 2013-2017 signed by the Government of the Republic of South Africa (Wycliffe Otieno, personal communication, 30 July 2016).

The UVS service was designed as an m-learning offering. M-learning can be defined as 'learning across multiple contexts, through social and content interactions, using personal electronic devices'⁷ (Crompton, 2013, p. 4). The promise of m-learning has been articulated by Wagner (2005) as follows:

Mobile learning represents the next step in a long tradition of technology-mediated learning. It will feature new strategies, practices, tools, applications, and resources to realize the promise of ubiquitous, pervasive, personal, and connected learning. It responds to the on-demand learning interests of connected citizens in an information-centric world (p. 44).

In addition, m-learning is considered to open new ways of extending the scope, scale, and quality of education (Mishra, 2011). McNeal and van't Hooft (2006) suggest that mobile phones might be a tool that increases inclusiveness and democratizes education by removing hierarchy and freeing learning from fixed places, times, and resources. Supporting this is a growing body of literature on the instructional benefits of mobile devices (Thomas and McGee, 2012, Johnson, Adams & Cummins, 2012; Thomas & McGee, 2012; Thomas & Orthober, 2011). The promise of m-learning, particularly in low-income environments, is premised on two main factors: the drop in the price of mobile handsets and usage costs, which makes mobile phones increasingly common, even in poorer communities; and on the highly flexible nature of mobile phones (J. Traxler, 2009).

Research directed to considering the relative merits of mobile interventions compared to other possible ICT options and other pedagogic interventions is presented in three recent landscape reviews on m-learning. These are Raftree's 2013 review of mobiles for youth workforce development, Wagner's 2014 review of mobiles for reading, and Roberts & Spencer-Smith's 2015 review of m-learning for numeracy in low income countries. These are supplemented by numerous other articles, such as those by Denk, Weber and Belfin (2007), and Mehdipour & Zerehkafi (2013). Two key findings are that much research 'pertains to digital content in general' and does not seem to build on the particular affordances of mobile access to digital content. Thus, low cost rather than the mobility of the mobile device is a driving factor for choosing mobiles (Roberts & Spencer Smith 2015, p.27), while little information is available relating to costs of interventions, which means there is limited data for cost comparisons, making this evaluation important in this regard.

While there is a growing research-base on m-learning globally, research into the efficacy of m-learning in the developing world is in its infancy (Koszalka and Ntloedibe-Kuswani, 2010). This point is supported by UNESCO (2012), where it is acknowledged that much documentation from the developing world is derived from implementation reports, conference sites, and blogs, which are descriptive and promotional, rather than analytical and evaluative, again highlighting the criticality of the UVS evaluation.

⁷ These electronic devices can be simple or advanced mobile phones, portable media players, pocket PCs, portable gameplayers (e.g. Nintendo DS), tablet computers, or even custom handheld devices.

South African e-learning context

A recent review of technology-enabled learning in Commonwealth countries in Africa and the Mediterranean (Isaacs, 2015) provides a succinct overview of the South African policy landscape. The legal landscape that governs ICT in education in schools, universities and colleges involves a fluid and complex web of laws and policies that cover, amongst others, the education, broadcast, ICT infrastructure, library, media, and publishing sectors (Isaacs, 2015). With regard to education, the two key pieces of relevant legislation are the National Education Policy Act (1996), which legislates on matters related to the governance of the national education system for the provision of basic education, and the South African Schools Act (1996), which ensures that all learners have the right to access quality education without discrimination. These are general education policy statements which do not specifically comment on ICT.

In terms of ICT infrastructure, the Electronic Communications Act (2005), which was amended in 2014, makes legislative and regulatory provisions for access to broadband infrastructure in schools through the establishment of an e-Rate within its Universal Service and Access Obligations (USAO) Framework and the Universal Service and Access Fund (USAF). The e-Rate is a 50% discounted rate for the provision of Internet services to schools. In relation to education, the e-Education White Paper (2004), which focuses on the use of ICT to accelerate the achievement of national education goals, is described by Isaacs (2015) as follows:

[The e-Education White paper] highlights the importance of connecting learners and teachers to each other and to professional support services and provides for the establishment of platforms for eLearning. It also seeks to connect learners and teachers to better information and ideas via an effective combination of pedagogy and technology in support of education reform. The primary goal of the White Paper was to equip every basic and further education and training learner with the knowledge and skills needed to use ICT confidently, creatively and responsibly by 2013. This goal was supported by a strong policy framework consisting of four components: equity; access to ICT infrastructure; capacity building; and norms and standards. (Isaacs, 2015)

In the ICT space, a more recent National Integrated ICT Policy Green Paper (2014) has been developed, which will give way to a more formal policy on ICT. The ICT Green Paper refers to a 50% discount for Internet connectivity to schools, referred to as an e-rate.

In 2013, a National Broadband Policy (also referred to as SA Connect) sets clear targets for broadband access for schools:

[SA Connect] states that by 2016, 50 per cent of public schools should have access to broadband at 10Mbps, increasing to 100 per cent by 2020. To realise the objectives and goals outlined in government policies, each government department has developed action plans. (Isaacs, 2015)

Within this legislative framework, serious problems with regard to quality and inclusive education provision have been acknowledged in South Africa. The National Planning Commission diagnostic report (2011) demonstrates awareness of the factors contributing to the problems within the education system:

Research evidence highlights the significance of factors or problems within the education system itself. These include the ongoing changes and amendments to curricula, the type of teacher training, inadequate support to teachers, teaching time compared to other activities and the availability of learning and teaching materials such as text books. Several other complex issues play a role in the quality of education. Curriculum design; language issues; the use of technology; the efficacy of the bureaucracy; the balance of power between parents, schools and the bureaucracy; and high-levels of violence against women and children are all relevant factors. Without dismissing any of these factors, our conclusion is that the main problems lie in teacher performance and the quality of school leadership. (National Planning Commission, 2011)

Key problems impacting on the quality of teaching and learning in South African schools are thought to be (poor) teacher performance and (poor) quality of school leadership. The diagnostic report outlines in detail factors relating to teacher

performance and quality of school leadership, which are major contributors to poor quality education in the priority subjects of languages, mathematics, and science, noting that ‘school performance is crucially linked to the leadership role of teachers, of principals and of parents’ (National Planning Commission 2011, p15). From a government planning perspective, therefore, priority investments are required to address the acknowledged problem of teacher performance and school leadership:

Teachers are the backbone of education and no system can function without good teachers. Their motivation, subject knowledge, the amount of time they spend teaching and their level of preparedness are all essential to the functioning of schools and learner achievement. (National Planning Commission 2011)

This national focus on teacher and school leadership development is important as it was within this context that the Branch T (Teachers, Human Resources, and Institutional Development) of the DBE, particularly its National Institute for Curriculum and Professional Development (NICPD), took an increased leadership role in the UVS.

The DBE has developed its ‘Action Plan to 2019: Towards the Realisation of Schooling 2030: Taking forward South Africa’s National Development Plan 2030’ (Department of Basic Education, 2015a). The first Action Plan preceded the National Development Plan, but the diagnostic report on education was taken into account when the Action Plan 2019 was developed. The Action Plan to 2019 includes 13 goals pertaining to learning outputs and enrolments for increasing grade promotions from Grades 1-9, the number of learners in Grade 3,6 and 9 mastering language and mathematics requirements, and increasing the number of Grade 12 passes in mathematics and physical science and average performance in mathematics and language in Grade 6 and 9 level. The priority goal for the next five years is increasing access to early childhood development (below Grade 1).

The DBE’s enabling goals (Goals 14-27) are also relevant as they provide an indication of which mechanisms are being prioritized to attain learning outputs and enrolment targets. The UVS is considered relevant to several of the goals relating to computer literacy, e-education, and both district support and parental involvement in school governance:

- Goal 16: Improve the professionalism, teaching skills, subject knowledge and computer literacy of teachers through their entire careers’ is a priority goal and makes explicit mention of teachers’ computer literacy.
- Goal 20 (referring to learner access to ICT in education): Increase access amongst learners to a wide range of media, including computers, which enrich their education.
- Goal 22: Improve parents and community participation in the governance of schools, partly by improving access to important information via the e-Education strategy.
- Goal 27: Improve the frequency of the monitoring and support services provided to school by district offices, partly through better use of e-Education.
- Goal 25 (focusing on learner wellbeing): Use schools as vehicles for promoting access to a range of public services amongst learners in areas such as health, poverty alleviation, psychosocial support, sport and culture.

The UVS was conceptualized within this context of a priority subject focus on mathematics and language for learners, coupled with a priority focus on teacher development and district capacity and an intention to improve parent and community involvement.

The DBEs *Action Plan to 2019*, also highlights that:

There is little research on how schools are currently making use of ICTs, and that the little system-wide information we have points to very little growth in access to ICTs amongst learners... Government needs to work more vigorously on partnerships that take certain aspects of e-education forward, or target particular disadvantaged areas. But for more widespread and sustainable development to occur, government and other stakeholders will need to strengthen the research and monitoring capacity in this area, as well as the overarching policy frameworks (Action Plan to 2019, p.14).

Consistent with the DBE Action Plan to 2019, the Integrated Strategic Planning Framework for Teacher Education and Development (ISPFTED) commits the DBE and its partners to invest in ICT to support the delivery of the strategy. Here the ISPFTED makes specific reference to:

- The establishment of the NICPD and an ICT Support System for delivering Teacher Education and Development (TED);
- The establishment of Professional Learning Communities (PLCs) to strengthen teacher professionalism;
- The development of diagnostic self-assessments to assess curriculum competence; and research on the implementation of the ISPFTED.

The DBE's intention to explore the UVS for teacher support was intended to harness the potential of ICT to meet the objectives of the DBE Action Plan and the ISPFTED. The establishment of the UVS preceded the launch of Operation Phakisa ICT in Education lab, which is a presidential initiative launched in October 2015 to fast-track the education goals of the National Development Plan through ICT.

In addition to these local and international policy frameworks, there are four important overarching contextual factors which need to be taken into account for this evaluation study:

First, UVS was the DBE's first attempt to develop a mobile-learning portal through a partnership agreement. There had been prior attempts at using m-learning to support a particular subject domain through the *Nokia Mobile Mathematics project* which commenced in 2008 (which was later changed to the *Microsoft Math* project).

UVS was positioned as an exploratory and innovative undertaking which would involve the partners in trialling and experimenting with a medium (m-learning in general, and the Mxit platform in particular) that was not yet fully developed and whose application in education contexts was not yet known.

Consequently, the project intervention was established as a partnership agreement in which the precise scope and functionality of what was envisaged for the service was not tightly defined or known at the outset of the intervention, although deliverables and targets were specified in the contract between UNICEF and Mxit Reach. As such, the project was seen as dynamic and open to change, requiring the project to respond accordingly.

Second, changes to the envisaged scope were made over time by mutual agreement between the partners. Initially, the DBE branch responsible for UVS was Branch S (Social Mobilization and Support Services),⁸ but, with the expansion of the focus of the service to include teachers, there was increased input and leadership from Branch T⁹. This resulted in the expansion of the vision and platform, which had initially focused on learners, to include teachers and parents. In particular, there was a fundamental shift in the target audience focus for the UVS from only learners to learners, teachers, and parents. This led to creation of a detailed theory of change and related 'results matrix' which specified what was expected through the UVS for the expanded scope.

Third, the context was also informed by the desire of the DBE to enable large numbers of learners, teachers, and parents to access educational resources and to improve learning quality. The focus on equity (a distinct priority of UNICEF as well) and access was the reason for choosing a platform that could be accessed by older, cheaper feature phones, and not just expensive smart phones. The choice of technology platform was critical decision in the planning conceptualisation stage. An existing social media platform – Mxit - which designed for mainly text-based social networking on feature phones was selected. Mxit describes itself as follows:

8 Responsible for safety, sport and enrichment, partnerships, social cohesion, equity, health promotion, psychosocial support and school nutrition.

9 Responsible for promoting the quality of teaching and institutional performance through effective supply, development and utilisation of human resources.

Mxit is a South African mobile social network with millions of monthly active users. The majority of our users are located in South Africa, and other key markets include India, Nigeria and Indonesia. Mxit puts conversation at the heart of everything and we facilitate conversations between people that you know, new people that you meet on Mxit, and organisations. These organisations can be brands, NGOs or government. Mxit is incredibly data-light, so users can spend more time chatting learning or playing, and an average user logs on 5 times, and spends 105 minutes per day on Mxit. One of Mxit's core strengths is our ability to tailor features with market-specific focus, and original localised content targeted at emerging market youth. In many ways Mxit is the first Internet experience for users in developing countries and we are still unrivalled in terms of our ability to provide a smart experience for feature phone users. In the past year, we have sharpened our focus on smart applications, whilst maintaining interoperability on more than 8000 devices, including tablets (<http://get.mxit.com/about/>).

The risks associated with choosing to use an existing social-media platform were considered. This decision-making process was recorded by the project partners as follows:

UNICEF South Africa began to engage with the Mxit Reach Trust in October 2012 and held several rounds of discussions before requesting a formal proposal be submitted for approval by the Country Office....During these discussions the subject of the choice of technology was discussed in great detail. A number of factors were considered, and it is important to bear in mind that the aim was to introduce a large-scale intervention (benefiting hundreds of thousands of learners, rather than doing a small scale pilot). Essentially there were two options (1) develop a brand new stand-alone application or (2) make use of an existing platform. The benefits and risks of each approach were assessed by UNICEF South Africa. The major benefits of utilizing the Mxit platform, included:

- No need to develop a front-end that could work on feature phones, Blackberry, Android and iPhone (this was very important in terms of equitable access, given the high proportion of feature phones in South Africa in 2012)*
- Reduced technology risk (Mxit was a mature technology platform and could handle 10 million concurrent users – many technology solutions fail under the load of a high number of users)*
- Reduced adoption risk (millions of learners were already using Mxit)*
- Leveraging existing education services on Mxit (no need to develop an API to allow systems to communicate with all the existing education services on Mxit)*
- Leveraging existing psycho-social services*
- Leveraging existing m-reading services (over 4,000 mbooks were available on Mxit at the time)*
- Data-efficient*
- Built-in messaging functionality*
- User management system*

The risks with Mxit included:

- Ukufunda was “buried” within Mxit making discovery more difficult (this could be overcome with the advertising campaign though)*
- Hosting charges;*
- Making use of a social network, where different aged users could potentially interact with one another*
- While it was possible to develop a stand-alone equivalent of the Ukufunda service, this would have been far costlier given the need to build the front-end, messaging functionality, APIs and data-compression technology, amongst other features. It would also have been expensive to market the service and there would have been risks that the technology would not have scaled effectively.*

(UNICEF Education Specialist at the time and Reach Trust CEO, meeting discussion notes, 20 July 2016)

Fourth, this intervention was undertaken in a rapidly changing technology environment. During original planning and conceptualization of the UVS in 2012, the Mxit platform was reportedly very popular amongst the targeted youth in South Africa (with approximately 10 million users). During the period under review, Mxit's popularity fell from around 4.9 million registered users in September, 2014 to 500 000 in December, 2015, most of whom were young people and thus more likely to be learners than teachers or parents. As a result, the platform became commercially unviable. The Reach Trust then secured funding to take over the running of the platform from September 2015.

Fifth, during the early part of the evaluation process (January to February 2016) the *ukuFUNda* partners reflected on 21st century Skills as a vision to which they were aspiring. In this process it was made clear that these skills were not considered in the inception stage for *ukuFUNda*, and that such skills are commonly referred to in developed contexts of the Global North. It was felt that difficulties with regard to access to learning resources in the resource-constrained context of South Africa – and particularly rural South Africa, where feature phone access was most pronounced - were the key drivers for the *ukuFUNda* innovation. Nonetheless, a summary of what was discussed w.r.t. 21st century skills is provided, as Addendum F.

CHAPTER 4: FINDINGS

This chapter is structured into two parts: First an overview of the UVS is provided. This draws on the data relating to expectations of the UVS as evident in various contractual agreements and the UVS Results Matrix; as well as the evaluation review of UVS service. Second the evaluation data is analyzed in relation to each of the agreed evaluation focus areas encompassing: effectiveness, relevance efficiency and cost effectiveness, ad sustainability.

Overview of UVS

As has been noted, the UVS is a platform that uses mobile technology (in particular, Mxit) to provide access to learning resources and content, counselling and safety services and other value-added services and programmes. The UVS was structured as a 'Programme Cooperation Agreement' (PCA) between UNICEF and RLabs (on behalf of, and representing, Mxit/The Reach Trust)¹⁰.

The basis for the agreement was the 5-year UNICEF programme and cooperation (2013-2017) with the Government of South Africa to improve the lives of women and children in South Africa, as specified in the UN Strategic Cooperation Framework for South Africa. It was to be implemented by working in partnership with beneficiary communities, civil society, the public sector, communities, and the private sector, amongst others. In this regard, UNICEF considered RLabs to be a civil society organization sharing UNICEF's values and principles.

The PCA, signed on the 13th of March 2013, states that UNICEF and RLabs wished to 'work together to implement the Health Education Programme of the Integrated School Health Programme for Foundation Phase learners of the UNICEF South Africa programme' (PCA, 2013). It was to run until the end of December 2014. There were substantial subsequent changes in the agreed scope of this intervention as the PCA referred to Health Education (which was later broadened to include education by including academic subjects), and the original target of 'Foundation Phase' learners was changed to secondary school learners (Grades 8-12).

In addition to this, the 'two year rolling plan 2013-2014', agreement between DBE and UNICEF included to outcome of relevant to UVS:

1. Improved access to quality education for all boys and girls, and increased school retention, completion and achievement rates
2. Strengthened education systems for the delivery of quality education for improved learner progression and performance in at least quintiles 1 and 2 schools.
3. Improved access to quality education for all boys and girls, and increased school retention, completion and achievement rates

The annual workplan that UNICEF signed with the DBE on 10th March, 2015 included the UVS work. This was 'a three year rolling work plan 2015-2017' which had 'improved access to equitable quality basic education for children in South Africa' as its envisaged outcome. This included a specific output of 'Strengthened maths/science teaching through pre/ in service teaching training with a focus on e-learning B, 5% of schools performing at 60% and above T: 60% with 60% pass in maths/science in all quintile one schools'. This in turn had two related outcomes:

- Support the roll out and monitoring of the virtual school's portal for educators, learners and parents based on new (self-diagnostic assessment) and existing resources; and
- Provide technical assistance to develop, implement and monitor the integration of ICT into teacher training and development.

¹⁰ The reason for the PCA being with RLabs and not the Mxit Reach Trust was that at the time of putting together the proposal for the UVS, the latter was not yet formally registered (only in the process thereof). The UNICEF representative at the time suggested that RLabs (another not-for-profit company founded by the Chairperson of the Mxit Reach Trust) should be used as an interim solution. In reality, all funds paid by UNICEF for the creation of the virtual school went directly to the Mxit Reach Trust (Andrew Rudge, personal communication, 21 August 2016).

Mxit/RLabs and DBE were assigned as implementing agencies to the 'virtual school's portal' outcome, and DBE was assigned as the technical assistance outcome. The 2-year 2013-2014 workplan explicitly focused on quintile 1 and 2 schools, and included reference to 'Develop virtual schools portal for educators and learners based on existing resources' which was an activity in support of the output: 'Strengthened math/science teaching through pre/in – service teaching training with a focus on e-learning'. There is not a strong alignment between the DBE-UNICEF 3-year work plan (2015-2017) and the UNICEF-Mxit/RLabs agreement (which also later changed in its focus). By way of example, while both the DBE-UNICEF rolling agreement focused explicitly on mathematics and science in quintile 1 and 2 schools, these details were absent from the PCA.

Three components of the UVS were planned to be rolled out in three phases across the country (UNICEF, 2015):

- 1) Phase 1: teacher app;
- 2) Phase 2: learner app; and
- 3) Phase 3: parent app.

Table 3 provides dates and details of the development and rollout of key aspects of the portal, as gleaned from the quarterly UVS reports prepared by Mxit Reach / the Reach Trust, and minutes of UVS project team meetings¹¹.

Table 4 *Dates and details of the development and rollout of key aspects of the portal*

Date	Detail
March 2012	Estimated date of signing DBE-UNICEF 3-year work plan 'rolling 3 year agreement' for 2012-2014.
July 2012	Pondering Panda and UNICEF discussions on project concept commence
Nov 2012	Pondering Panda survey: <i>Education in South Africa</i>
Nov 2012	UNICEF/Mxit proposal to DBE to create the UVS portal.
Jan 2013	Pondering Panda survey: <i>Bullying in South African schools</i>
April 2013	Signing of the PCA between two partners: UNICEF and Mxit Reach/R-Labs. A five year UNICEF- DBE country level agreement of cooperation had been signed prior to this for all DBE-UNICEF collaborations. The launch of the UVS was set for August 2013.
April 2013	A version of the dashboard was created by Mxit and demonstrated to UNICEF (using dummy data)
June 2013	Pondering Panda survey: <i>Youth Hope survey</i>
Sept 2013	Completion of the core components of the UVS on Mxit (learner education and safety apps).
Sept 2013	Testing of the UVS learner app with ten learners from Stellenbosch schools.
Oct 2013	Consultative meeting with approximately 100 DBE, provincial Department of Education, and various education stakeholders (including South African Council of Educators, the National Education Evaluation and Development Unit of the DBE, and University academics) on Pondering Panda youth survey
Nov 2013	Completion of the UVS teacher app by Mxit Reach.
Jan 2014	Start of the academic year for South African schools
Feb 2014	Pilot rollout to six schools in the Western Cape (through the Western Cape Education Department).
June 2014	Pondering Panda survey: <i>Keeping our children safe</i>
Aug 2014	Pilot rollout to ten schools in the Eastern Cape (through the Nelson Mandela Metropolitan University or NMMU).
Aug 2014	Training of 159 Teachers' Centre managers on use of the UVS (see DBE, 2014a).
Sept 2014	The original Mxit dashboard development team (for the dummy version) were no longer available, and the dashboard had to be re-created
Sept 2014	Official launch of the UVS at a ceremony at the Sci-Bono Centre in Johannesburg. Start date for uptake and use data for the evaluation.

¹¹ These project meetings included representatives from all the project partners, and ran monthly from October 2014 to April 2015.

Date	Detail
Sept 2014	Launch of the 'My Calendar' function, and options for the teachers to communicate with their learners ('My Classroom') and to chat with their peers ('My Groups').
Sept 2014	Training of 50 e-learning coordinators on ICT integration (including a two-hour session focused exclusively on UVS ⁹) (see DBE, 2014b).
Oct 2014	Presentation of Ukufunda at M-Alliance conference (Washington DC)
Oct 2014	Pondering Panda survey: <i>Learner behaviour in October holidays</i>
Nov 2014	Development of the monitoring and evaluation framework, and related 'Results Matrix'
Nov 2014	Presentation of Ukufunda at: GSMA mWomen Conference (Cape Town) & Rockefeller Impact Sourcing at Scale: Moving from Idea to Practice (Johannesburg)
Dec 2014	Extension of the UVS PCA between RLABS and UNICEF for three months. This was due to the huge delay in the launch of UVS, which meant that by the end of the PCA the portal had been live for less than 4 months only ¹⁰
Jan 2015	Start of the academic year for South African schools
Feb 2015	Presentation of Ukufunda at: UNESCO mobile learning week (Paris) & Pre-State of the Nation Address (SONA) event (Cape Town)
Feb 2015	Completion of the UVS parent app by Mxit Reach.
March 2015	Signing of the DBE-UNICEF rolling 3-year workplan (2015-2017).
Mar 2015	Creation of the UVS dashboard. End of funding from UNICEF to Reach Trust
Mar 2015	ICT in Education Summit (Johannesburg)
April 2015	No further funding obtained from UNICEF by the Reach Trust.
May 2015	Survey run on UVS 13-18 May 2015: Do you think schools should make condoms available to learners? (2622 learner responses)
June 2015	UNICEF commentary on DBE Draft National Policy on HIV, sexually transmitted infections, and tuberculosis including the questions on condoms
July 2015	UVS wins Africa EduWeek award
July 2015	SABC Education Week (Johannesburg)
Sept 2015	Further training of same 50 e-learning coordinators which revised what had been covered in September 2014, in another two-hour training session which provided more depth ¹¹ (see DBE, 2015b).
Sept 2015	Alternative donor funding for Mxit secured by The Reach Trust (to ensure that all Reach Trust services – including the UVS – could continue)
Oct 2015	mEducation Alliance (Washington DC)
Dec 2015	End of the academic year. End date for uptake and use data for the evaluation

A monitoring and evaluation framework was developed as part of the UNICEF approval process in the period January to March 2013, to govern implementation and impact of the UVS, while the oversight committee (comprising UNICEF, DBE, and The Reach Trust representatives) subsequently developed a Results Matrix in November, 2014 (19 months after the signed PCA). The UNICEF education specialist explained that the development of the 'results matrix' was a response to oversight functions where reports on the project progress were being reflected upon (Saadhna Panday-Soobrayan, personal communication, 28 July 2016).

The oversight committee agreed that the UVS ought to be evaluated against the Results Matrix as this was the framework agreed to by all partners; it was therefore against this framework that the Reach Trust structured its progress reports. However, reporting relating to finances made use of the budget line items as outlined in the contractual agreement. As such, project progress reporting and financial reporting were not aligned.

The Results Matrix was structured using type of results (distinguishing outputs from activities), results, indicators, baselines, targets and means of verification, timeframes and assumptions and allocation of partner responsibilities. The 'Results Matrix' defined the following project expected outcome: 'Improved quality of teaching and learning through the development of virtual school mobile application that supports teacher and learners with education and psychosocial support material'.

This overarching expected outcome was expected to be attained through three outputs:

Output 1: A virtual school mobile application that provides learners, teachers, and parents with quality educational tools is developed and deployed.

Output 2: Educators, learners and parents use virtual school.

Output 3: ukuFUNda is utilised for collecting and dissemination of strategic information.

Each output was then broken down by activity as follows:

Table 5 *Results Matrix Breakdown of output 1 and related activities*

Output 1	A virtual school mobile application that provides learners, teachers and parents with quality educational tools is developed and deployed
Activity 1.1	Design of the Virtual School. This includes the conceptual design, and then identification of the specific components of the virtual school (e.g. which applications to include, what is the user journey, how is data stored at a user level).
Activity 1.2	Development of Ukufunda based on the specifications identified above.
1.2.2	Development of communication apps for teachers and learners that improves communication between different groups and enhances learning and teaching.
1.2.3	Content for messaging via My Calendar, My Groups (learning communities for educators)
1.2.4	Aggregation of all existing counselling support services into one app, My Wellness and Safety
1.2.5	Upload Content for CSTL section on Ukufunda
1.2.6	Development of parent section on Ukufunda
1.2.7	Development of Self Diagnostic Tool for Teachers
Activity 1.3	Testing on various mobile handsets and with selected groups of users.
Activity 1.4	Deploy Ukufunda virtual school

Table 6 *Results Matrix Breakdown of output 2 and related activities*

Output 2	Educators, learners and parents use virtual school
Activity 2.1	Promote Ukufunda awareness in the media
Activity 2.2	Platform awareness of Ukufunda via notifications, banners, splash ad campaigns
Activity 2.3	Activations (in-school and public spaces) and provincial training sessions
Activity 2.4	Presentations to School Governing Bodies (SGBs), Trade Unions and Provincial DOEs
Activity 2.5	Teacher Development Centre Managers

Table 7 *Results Matrix Breakdown of output 3 and related activities*

Output 3	Ukufunda is utilized for collecting and dissemination of strategic information
Activity 3.1.1	Conceptualise dashboard and data requirements
3.1.2	Design
3.1.3	Web interface development
3.1.4	Testing
3.1.5	Deployment of dashboard
Activity 3.2	Learner Happiness Index
3.2.1	Learner Happiness Index Learner Happiness Index Wave 2 Learner Happiness Index Wave 3
3.2.2	Ad hoc surveys
Activity 3.3	Conferences

The full results matrix can be found in Addendum E.

As can be seen, project planning documents changed over time, while the UVS theory of change was ‘retrofitted’ to project design. The introduction of this detailed planning framework was a result of a change in policy at UNICEF, which required all projects to include a theory of change against which progress could be measured through the monitoring and evaluation process. It had the added benefit of providing a way for the project management team to systematise the deliverables and monitor progress. Thus, the fact that the theory of change was retrofitted is less-than-ideal, it was definitely a case of ‘better late than never’.

However, most of the project partners considered there to be a theory of change guiding the UVS, even though this was not formally documented from the outset¹². They expected that making available educational resources, and psychosocial services which could be accessed using mobile phones would have a positive ‘impact’ on secondary schools, which seemed to be broadly agreed to be ‘improved learning outcomes’. These learning outcomes were defined to refer to ‘Performance rates for grade 9 numeracy and literacy’ which would be measured from a baseline of ‘2012 Annual National Assessment (ANA) results’, with a target of ‘2% improvement Year on Year in Grade 9 ANA tests’.

The mobile apps

The applications included in the UVS were analysed through a review of the front-end system. However, based on analysis of project documentation, it is apparent that there are differences between: (1) what was planned; (2) what was initially included; and (3) what is currently visible. It must be noted that although the identities of the specific applications changed over time, the focus of the apps (viz. psycho/social and academic support) did not.

To provide a complete picture of this changing landscape we have therefore attempted to describe the evidence relating to what is currently available on the service, and refer to other applications which were built and are not being used, or applications which were on the service and which have been removed.

The launch documentation indicated that the UVS included the following services in September, 2014:

- My Calendar - Notification on tasks and events
- My Educational Resources - Links to textbooks and reference material
- My Safety and Wellness - Links to counselling and emergency services
- My Groups - Virtual communities of practice

The UVS made applications available to users through three views: a learner view, a teacher view, and a parent view. The following table indicates the information and applications were found on the UVS platform in early March 2016, for each user view:

Table 8 *UVS applications and information services (learner, teacher, parent views) as in March 2016*

Learner		Teacher		Parent	
Homework tips and advice	Information	School self-evaluation instrument	Information	My SGB	Information
How to set your goals	Information	Classroom management	Information		

¹² It should be noted that there were a number of changes in personnel at all three partner organisations, so it is difficult for the (current) project partners to comment on the original ‘theory of change’

Learner		Teacher		Parent	
My educational tools	CareerXplora	My educational resources	CareerXplora	My library	CareerXplora
	Everything Maths		Everything Maths		FunDza
	Everything Science		Everything Science		Mindset Learn Xtra
	FunDza		FunDza		Nal'iBali
	Magic tables		Mindset Learn Xtra		Periodic Table
	Mindset Learn Xtra		Nal'iBali		QuizMax
	Periodic Table		Periodic Table		Rethink education
	QuizMax		QuizMax		
	Rethink education				
My safety and wellness	Childline	My safety and wellness	Childline	My safety and wellbeing	Childline
	Family Safety Center		Family Safety Center		Family Safety Center
	LoveLife		Mac911		Mac911
	Mac911		MobieG		MobieG
	MobieG		MySafety		MySafety
	Rape Crisis		Rape Crisis		Rape Crisis
	Thuthuzela Care Centres (TCC)		TCC		TCC
	MGirls				
Mychoma					
My calendar	A calendar of events	My calendar	A calendar of events	My calendar	A calendar of events
Ts and Cs		Ts and Cs		Ts and Cs	

The UVS comprised both applications developed by third-party service providers and made available through the UVS via its menu structures bespoke applications developed specifically for UVS.

Third-party applications aggregated into the UVS

Several third party service providers partnered with UVS to have their applications integrated into the UVS service. Most apps on the UVS were either created by such third party service providers or by Mxit Reach prior to the establishment of the UVS service (Andrew Rudge, personal communication, 3 May 2016). Most agreements with third party service providers were made by Mxit, using an electronic agreement (Andrew Rudge, personal communication, 23 May 2016).¹³ These covered either pre-existing applications which were brought into the UVS, or applications developed by third party partners during the UVS implementation period, for which there was no financial transaction and the development costs for the third party applications did not constitute part of the UVS investment. Service providers were to share revenue generated from their mobile applications in a 70:30 revenue share agreement with Mxit. However, no revenue was

¹³ A generic contractual agreement between Mxit and third party service providers is provided as Addendum C.

generated from advertising which could be dispersed to the third party service providers.

As indicated, specific applications included in the UVS changed over time. Table 8 provides details on applications available on the UVS as at March, 2016:

Table 9 *Third party applications available on UVS (March 2016)*

UkuFUNda category		App name	Target audience	Grade focus	Content focus
My educational tools	1	Fundza	All	8-12	Language
	2	CareerXplora	All	8-12	Free career counselling and advice
	3	Everything Maths	Learners and teachers	8-12	Mathematics
	4	Everything Science	Learners and teachers	8-12	Physical Science
	5	Mindset Learn Xtra	All	8-12	7 subjects
	6	Periodic Table	All	8-12	Physical Science
	7	Quiz Max	All	8-12	General knowledge
	8	Magic tables	Learners	8-12	Maths – multiplication tables practice
	9	Rethink education	Learners and teachers	8-12	Maths and Physical Science curricula; past exams; Khan Academy videos
	10	NaliBali	Teachers and parents	n/a	Stories for toddlers and Grade R children
My safety and wellness	11	Childline	All	3-17 year olds	Online one-on-one counselling within Mxit
	12	Family safety centre*	All	8-12	Internet safety tips
	13	Mac 911	All	8-12	Reporting of a life-threatening emergency using a USSD code
	14	MobieG	All	8-12	Careers and life skills advice; online counselling
	15	Rape Crisis	All	8-12	Supporting and empowering rape survivors
	16	Thuthuzela Care Centres	All	8-12	Support for those who have experienced sexual abuse
	17	LoveLife	Learners and teachers	8-12	Information on AIDS prevention and other sexually-related issues. Online counselling
	18	MyGirls	Learners	8-12	A programme specific to girls' development (health issues)
	19	MyChoma	Learners	8-12	A programme specific to girls' development
	20	My safety (previously called Google Safety)*	Teachers and parents	N/A	A listing of various Mxit apps related to safety

Table 9 presents information on apps that, at some point, were hosted on the UVS, but no longer appear there. The Reach Trust reports that the majority of apps were removed because the partners did not update their service to include a backlink to UVS; because they were unwilling to remove adverts that were not appropriate for learners; or because the apps were becoming 'buggy' since they were not being updated by the app's developers to keep pace with changes in Mxit (Andrew Rudge, personal communication, 29 March 2016).

Table 10 *Third-party applications previously on UVS*

UkuFUNda category	App name	Target audience	Grade focus	Content focus
My educational tools	Chess	Learners	All	Online chess game
	Oxford Word of the Day	All	8-12	The Oxford dictionary
	Springbooks	Learners	8-12	A library of the classics e.g. Shakespearean plays
	Mobi School	Learners and teachers	8-12	Linked to an SABC show called Geleze Nathi and featured video content linked to academic content
	Reach Maths		8-12	Mathematics support
	Sf.sudoku	Learners	8-12	The popular Sudoku game
	Yesa_quest	Learners	10-12	Young Engineers of South Africa - mentorship of learners interested in a career in CAT by students at NMMU
	M-books	Learners	8-12	Library of books and poetry
	Study and Exams	Learners	8-12	Exam preparation and tips (link)
My safety and wellness	Angel	All	8-12	A substance abuse counselling service

There are also one or two applications referred to at the outset that were never included (for example Dr Math, which was discontinued on Mxit in 2014 – Andrew Rudge, personal communication, 21 August 2016).

The collaboration between The Reach Trust and the third party content providers was considered by The Reach Trust to be a ‘win-win collaboration’ as the content provider gained access to an established Mxit youth audience (at a time when Mxit had large numbers of users); while Mxit gained content with which to ‘keep existing users more engaged’ (Andrew Rudge, July 2016), by making use of the ‘Mxit Launch’ or dev.mxit.com site to upload and maintain their own content. There is no evidence that any direct financial transaction took place for this, with each party retaining responsibility for its own costs.

Service providers were able to advertise in their content/channels and obtained a component of this revenue. When this was done through Mxit, there were ethical guidelines through which advertising was filtered. The first filter was the general Mxit ethical guidelines for advertising (for example, no adult content or gambling advertisements and a neutral stance on politics and religion), but advertising restrictions on UVS went further (for example, no advertisements for alcohol, financial products, and extractive industries) (Andrew Rudge, personal communication, 1 June 2016). No revenue was ever generated through these agreements.

Bespoke applications developed specifically for UVS

Bespoke applications that were indicated in the Results Matrix as needing to be developed as part of the UVS include:

- 1) Communications apps for teachers and learners, which were to include the following communication tools: MyCalendar, MyMessage, MyClassroom, and MyGroups.
- 2) My Wellness and Safety app.
- 3) A Care and Support for Teaching and Learning Programme (CSTL) app.
- 4) UVS parents app.
- 5) Teachers' self-diagnostic app.

Subsequent to the creation of the Results Matrix, all of these apps were developed, although sometimes with different names and a somewhat different focus. Table 10 provides details of the apps envisaged and created.

Table 11 *Apps envisaged in results matrix compared with apps created*

Results matrix specification	Name of created app	Level of equivalence
Communications apps for teachers	<i>ukuFUNda_teacher</i>	Equivalent
Communications app for learners	<i>ukuFUNda_learner</i>	Equivalent
My Wellness and Safety app	MySafety	Equivalent
CSTL app	School Nutrition	App developed was the most urgent part of CSTL, but did not cover the complete requirement for CSTL as outlined in the 'results matrix' ¹² .
<i>ukuFUNda</i> parents app	<i>ukuFUNda_parent</i>	Equivalent
Teachers' self-diagnostic app	School self-evaluation app	Equivalent in level of complexity, but with a different focus

We briefly describe the basic functionality and current status of each bespoke application in turn.

ukuFUNda teacher, *ukuFUNda* learner, *ukuFUNda* parent

The communication application was described in terms of three related activities in the Results Matrix:

- Activity 1.2.2: 'Development of communications apps for teachers and learners that improves communication between different groups and enhances teaching and learning';
- Activity 1.2.3: 'Content for messaging via My Calendar, My Groups (learning communities for educators)'; and
- Activity 1.2.6: 'Development of parents section on *ukuFUNda*'.

The content for the application was to be developed by DBE and UNICEF (Activity 1.1.2.3), while the applications were to be developed the Reach Trust and the DBE (teachers and learners) and by the Reach Trust (parents).

Three bespoke apps for the three different user groups in the service were created. There are several functions within each UVS application that are almost identical to each other as they share the same underlying functionality: to create and message contacts and groups and manage events in a calendar within the UVS. We therefore describe these applications together, as their functionality is identical. The intention of this application was to enable the DBE to communicate with the teachers, learners, and parents using the service and to allow these target groups to manage

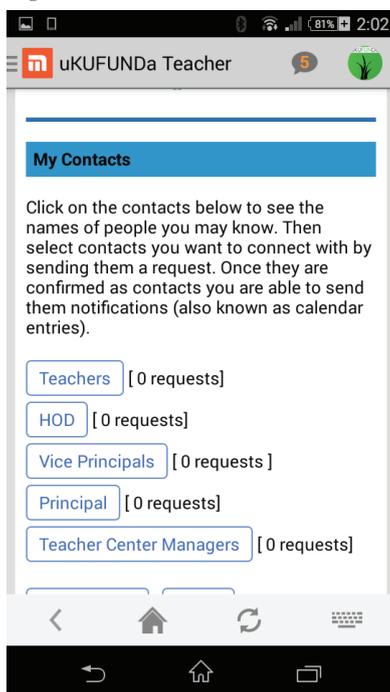
events through a calendar, and communicate with each other through establishing groups.

Functionality varies slightly depending on the UVS user group targeted:

- My contacts (teachers);
- My groups (teachers);
- My classroom 1 (learners interact with teachers);
- My classroom 2 (teachers interact with learners); and
- My calendar (all).

The *ukuFUNda* teacher 'My Contacts' functionality¹⁴ enables teachers registered with the service to store and manage contacts (or other users in the UVS). The homepage opens to allow a teacher to see their existing contacts and search for new contacts from each of the groups below:

Figure 8 Screenshot of *ukuFUNda* teacher 'my contacts' home page



A teacher can also search for learner contacts¹⁵ and compose messages, send them, and view sent messages¹⁶.

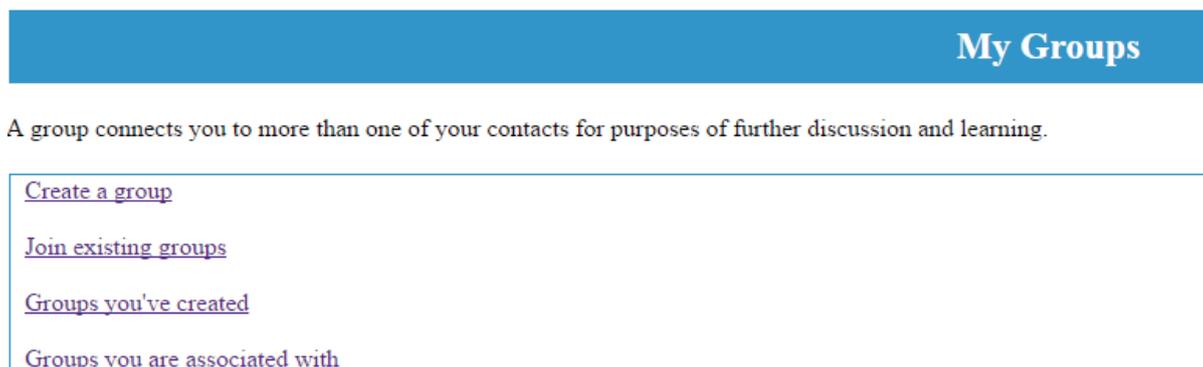
14 http://41.191.127.53/teacher/teacher_contacts/

15 http://41.191.127.53/teacher/teacher_accesslearners/

16 http://41.191.127.53/teacher/teacher_messages/

The *ukuFUNda* teacher 'My Groups'¹⁷ enables teachers to create group chats (for example, teacher discussion forums). Selecting 'my groups', opens the following page:

Figure 9 'My groups' teacher – menu options



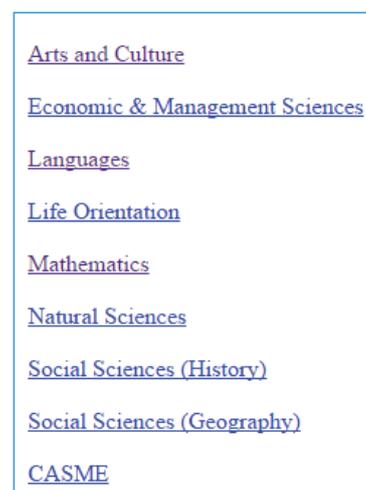
This gives a menu of four options:

- 'Create a group' (If you choose that, you need to name your group and then add members from your contacts. Then you can start writing messages that it is presumed all group members will see).
- 'Join an existing group' (this follows a step requiring an indication of subject specialization) If you click on a particular subject, it asks you for a 'thread' (which the evaluation team was unable to create, since we were not linked to another user in the group).
- 'Groups you've created'. This allows you to visit a group to see messages and view the members of groups you have created.
- 'Groups you're associated with'. This allows you to visit a group to see messages and view the members of groups you have joined.

A design decision was made to restrict the message threads to a particular subject area. There was no freedom to create a discussion group with a particular non-subject-specific thread (say, discipline or assessment). Further, the options provided for 'subject specialization' lists subjects that are particular to GET rather than FET level¹⁸ which is the focus of the service (see screenshot below):

Figure 10 Teacher groups drop-down list for subject specialization

Subject specialisation



These choices were discussed with TCMs and teachers, but it has been observed that, perhaps, in these meetings too

¹⁷ http://41.191.127.53/teacher/teacher_groups/ functionality

¹⁸ The options were selected based on the fact that the subjects at GET level are broader in specification (Andrew Rudge, personal communication, 30 May 2016)

much information was being provided and not enough feedback generated (Andrew Rudge, personal communication, 23 May 2016).

'My Classroom 1'¹⁹ enables learners to link with their teachers. When you go into the app, you can click on 'add teachers' and then it checks which teachers are registered at the school that the learner is from. Thereafter, it is presumed, you can send a link request.

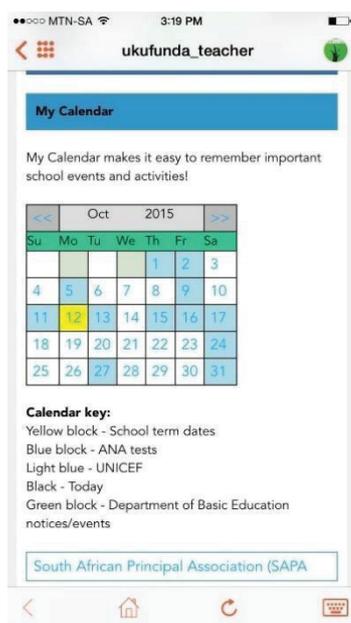
'My Classroom 2'²⁰ is in the teacher profile, and allows teachers to host discussion groups with learners. The evaluation team was not able to see how this works since our (dummy) teacher profile did not have any grades, classes or contacts.

The 'My Calendar' functionality allows for the following people to add important dates, assuming they have the appropriate authorization and access information. This included:

- DBE officials
- UNICEF staff
- Reach Trust staff
- Individual teacher members (only on their own calendars and those of contacts)

The screenshot below, showing the month of October 2015, shows examples of dates added:

Figure 11 *ukuFUNda teacher 'My Calendar' function (October 2015)*



Individual users can also receive notifications of events, task, announcements, and so on from their contacts. In this way, this app integrates with the 'my contacts' app described above. Users can also add personal date reminders to their own calendars.

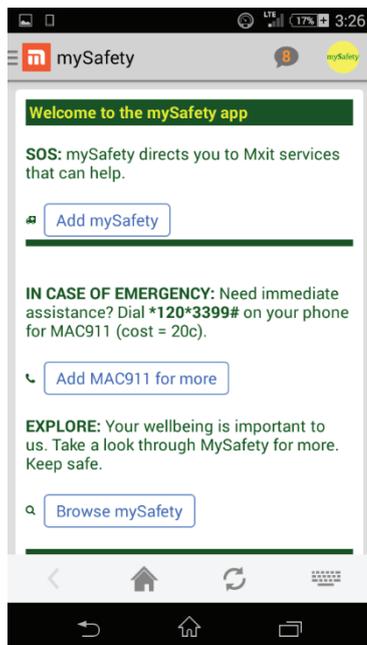
MySafety (previously known as Google Safety)

The 'MySafety' app is branded as a Mxit (not UVS) application. It was built by the Reach Trust in conjunction with Google and Yahoo! and made available to all users on Mxit (not just those who registered on UVS). It is an interface that presents options to connect to other Mxit / UVS safety applications from a single page. For example, the front page allows for adding MAC911 (one of the other safety and wellness applications included in UVS):

¹⁹ http://41.191.127.53/learner/learner_classroom

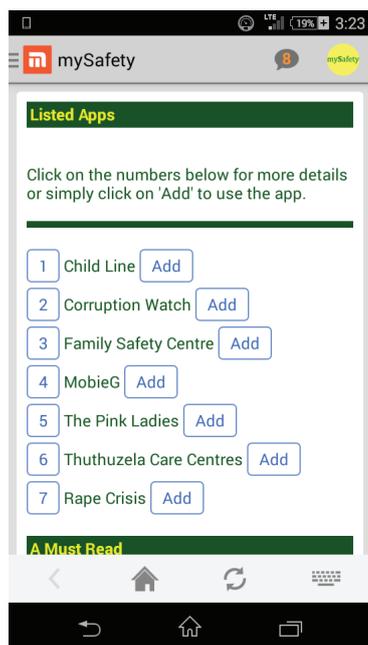
²⁰ http://41.191.127.53/teacher/teacher_classroom/get_teacher_grades

Figure 12 'MySafety' home page



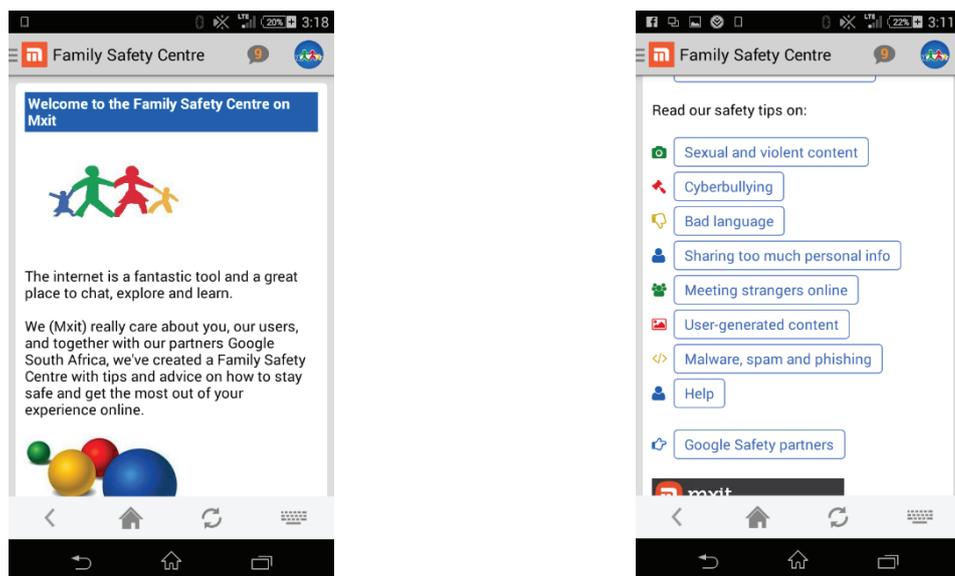
When selecting 'Browse MySafety', options of seven further links to other applications are provided (many of which are listed as UVS health and wellness applications such as MobieG, Thuthezela Care Centres and Rape Crisis).

Figure 13 'MySafety' pages



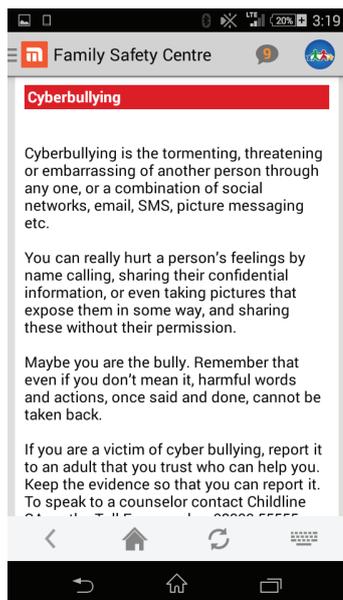
MySafety seems to comprise links to other UVS health and wellness applications, and a connection to three information pages: 'cyber-bullying', 'school bullying' and 'remember the following'.

Figure 14 Mxit Family Safety Centre (homepage)



It is primarily a text and graphic information service with some tips included relating to each topic. Each information pages also includes a field which allows for comments and a link for users to join the ChildLine chatroom. The following is an example of an information page from Family Safety Centre.

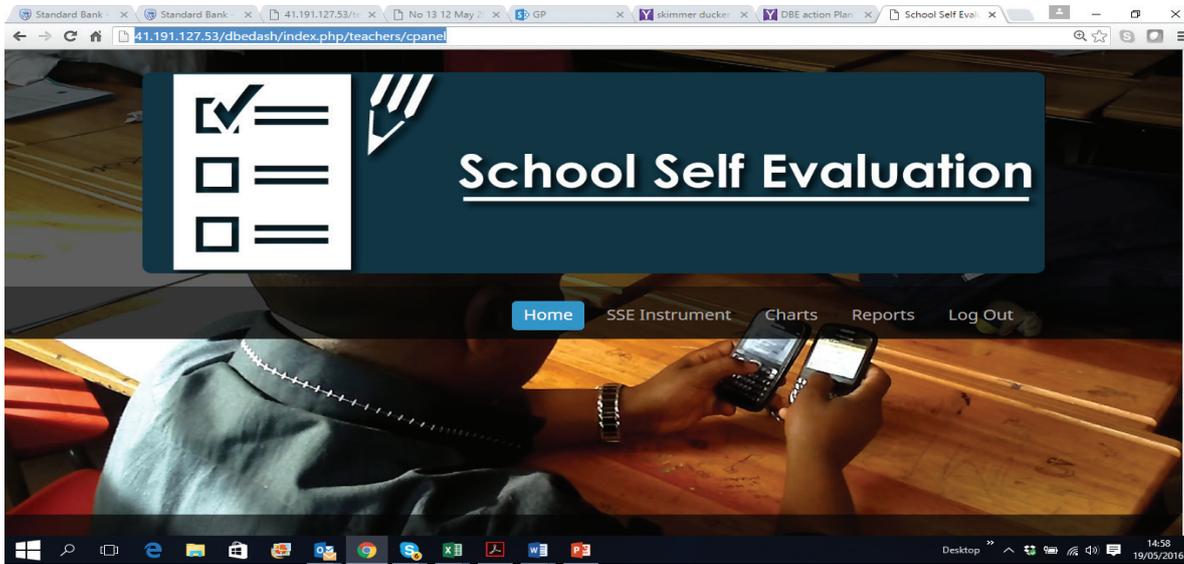
Figure 15 Sample page of the 'Family Safety Centre app'



School self-evaluation app

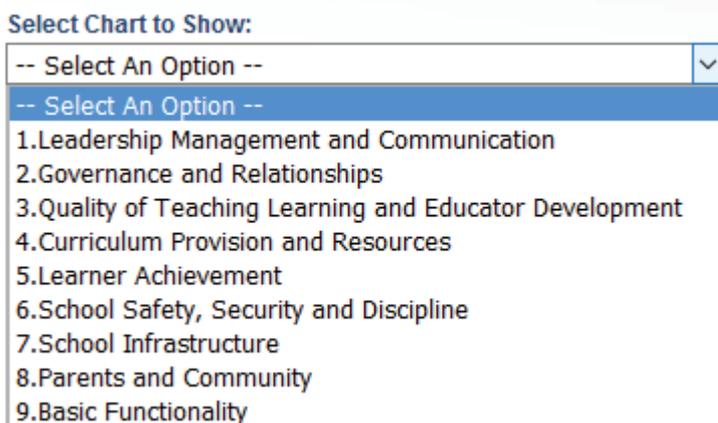
A school self-evaluation (SSE) application was developed as part of the UVS portal.

Figure 16 *School self-evaluation application (home page)*



The SSE app²¹ is designed to allow a school principal or school management team to complete the School Self Evaluation form (which is also available in a paper format) online (using a mobile or computer). The interface includes a menu structure relating to the SSE instrument (the questionnaire), charts (bar graphs of each question) and reports (providing feedback on the data collected from the instrument). The SSE includes numerous questions (the exact number of which we could not determine from the backend access) that feed into 49 summary statements divided into nine areas of a school's operation (as shown below):

Figure 17 *School self-evaluation app - summary areas*



For example, one area is 'governance and relationships'. There are four summary statements in this area:

- SGB is duly established and functions effectively.
- SGB provides the school with clear strategic direction.
- SGB executes its function with regard to the school finances within its legal mandate.
- SGB executes its function with regard to human resources within its legal mandate.

Examples are shown below of questions that feed into these summary statements.

²¹ <http://41.191.127.53/dbedash/>

Figure 18 *Example of SSE report*

The SGB has established all relevant committees (e.g. finance, fundraising, etc.)

The SGB keeps minutes of each meeting

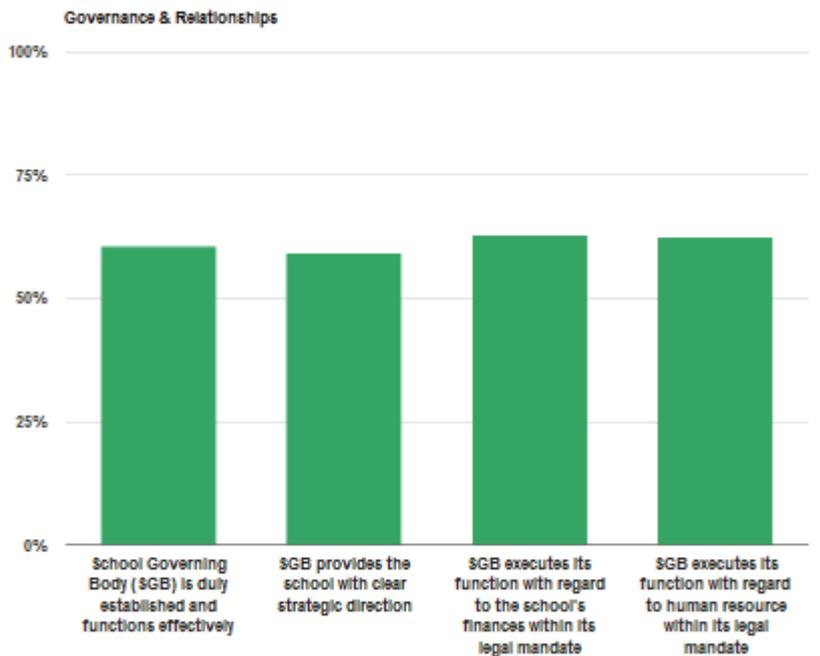
SGB has formulated a Vision and Mission Statement through consultation

The SGB has developed a Finance Policy to manage the school's finances

SGB ensures due process in the interviewing and selection of all staff

SGB appoints and reimburse staff of the school in compliance with legislation

Data collected by principals completing the questions is collated and presented in the form of bar charts (as shown in example below).



School Nutrition app

This app²² is a tool by which an audit of the National School Nutrition Programme (NSNP) cooking facilities, equipment, and utensils can be carried out. It consists of sets of questions on each of the following six topics (41 questions in total):

- School info;
- Cooking facilities;
- Food storage area;
- Cooking equipment;
- Inventory records monitoring;
- Partnerships.

²² <http://41.191.127.53/teacher/audit/>

The following screenshot shows the 41 questions asked. Some questions are open-ended and some have a drop-down box of options.

Figure 20 NSNP audit questions

A. BACKGROUND INFORMATION OF THE SCHOOL

1. province : | [Edit](#)
2. District circuit APO : | [Edit](#)
3. District official name and contact : | [Edit](#)
4. Name of the School : | [Edit](#)
5. EMIS Number : | [Edit](#)
6. Quintile : | [Edit](#)
7. School Enrolment : | [Edit](#)
8. Number of learners participating in NSNP : | [Edit](#)
9. Telephone Number : | [Edit](#)
10. Fax Number : | [Edit](#)
11. Email Address : | [Edit](#)
12. Contact Person : | [Edit](#)
13. Please indicate the grades offered at school : | [Edit](#)

B. COOKING FACILITIES

1. Type of food preparation area : Built kitchen | [Edit](#)
2. Who provided the facility : | [Edit](#)
3. Is there a dining hall : | [Edit](#)

C. FOOD STORAGE AREA

1. Does the school have a storage area : | [Edit](#)
2. If yes indicate area used for storage : | [Edit](#)
3. Are there shelves in the storage area : | [Edit](#)
4. If yes what type of material : | [Edit](#)
5. Is there a cold room : | [Edit](#)
6. Is there a freezer : | [Edit](#)
7. Are there windows in the storage area : | [Edit](#)
8. Is the storage area lockable : | [Edit](#)

D. COOKING EQUIPMENT

1. Did your school receive a gas stove : | [Edit](#)
2. If yes indicate size and quantity : | [Edit](#)
3. Did your school receive a gas cylinder : | [Edit](#)
4. If yes indicate size and quantity : | [Edit](#)
5. Is the cylinder kept in the locked cage outside : | [Edit](#)
6. If no please clarify : | [Edit](#)
7. Did your school receive cooking pots : | [Edit](#)
8. If yes indicate size and quantity : | [Edit](#)
9. Please indicate if the following were received : | [Edit](#)
10. Did you receive any other items not mentioned above : | [Edit](#)
11. If yes please specify : | [Edit](#)

E. INVENTORY RECORDS MONITORING

1. Are delivery notes invoices of all items available : | [Edit](#)
2. Is inventory records register available : | [Edit](#)
3. Are inventory records regularly verified : | [Edit](#)
4. Are redundant or lost items properly recorded : | [Edit](#)

F. PARTNERSHIP

1. Did your school receive any equipment from partners : | [Edit](#)
2. If yes please indicate the name of the partner : | [Edit](#)

This application was signed off by the DBE in June 2016.

Use of the virtual school

According to interview data, the key focus in stimulating use of the UVS was primarily to create platform awareness via: notification, banners and splash ad campaigns delivered in Mxit; a launch event; engagement with some media platforms; and the creation of a short marketing video which was used at the launch event. Potential beneficiaries were also made aware of the UVS through intermediaries in the DBE network. The DBE included the following marketing initiatives:

- The UVS was officially launched on 12th September, 2014 by the Deputy Minister of Basic Education, the MEC for Education in Gauteng, the Chief of Education at UNICEF South Africa, and the CEO of Mxit Reach. This launch was covered by the South African Broadcasting Corporation (SABC) and the print media.
- 159 Teacher Centre Managers (from 147 teacher centres) and provincial education department officials from all nine provinces were trained on UVS in August, 2014 (in the month prior to the launch of the UVS).
- 50 e-learning specialists from all nine provinces received training twice (in September, 2014 and September, 2015), with the first training period preceding the launch of the UVS.
- National officials from the DBE were encouraged to 'walk the talk' through engagements with DBE colleagues responsible for the UVS.
- UVS featured in various Teacher Development and Curriculum Management Heads of Education Departments Committee (HEDCOM) sub-committee meetings, as well as in Council of Education Minister meeting reports, under the topic 'ICT integration'. Attendees included the Heads of Education Departments in Provinces, as well as the DBE Senior Management (including the Director General and the Ministers). HEDCOM meets six times a year.

In relation to 'activations at 1,000 schools' the Reach Trust indicated that this would 'only be undertaken as part of the renewal of the contract and will be undertaken by a third party with experience in this space'. As the contract was not renewed, no school activations took place. The Reach Trust team indicated that one school was visited in the Eastern Cape (this was the 'best case' school that was visited by the evaluation team). User-testing involved bringing some learners (about ten) into the Reach offices to test use with the team.

Information about the UVS was shared at the following conferences, both locally and internationally:

Table 12 *Conferences at which the UVS was marketed*

Conference	Dates	City	Conference audience
mEducation Alliance	20 to 21 October 2014	Washington DC	International academics, NGOs, agencies
GSMA mWomen Conference	November 2014	Cape Town	Tech community, mobile operators, educationalists
Rockefeller Impact Sourcing at Scale: Moving from Idea to Practice	13-14 November 2014	Sandton	Local and international NGOs, government agencies
UNESCO mobile learning week	24 to 25 February 2015	Paris	mLearning experts, UN staff, academics
Pre-SONA event	February 2015	Cape Town	Government ministers and other civil servants and dignitaries
ICT in Education Summit	27 to 28 March 2015	Sandton	Education professionals, teachers, university lecturers
SABC Education Week	1 to 2 July 2015	Sandton	Education professionals, teachers
mEducation Alliance	28 to 30 October 2015	Washington DC	International academics, NGOs, agencies
UNICEF Namibia and the Namibian Dept of Education	July 2016	Namibia	Government ministers and other civil servants; international agencies

Using UVS to collect and disseminate strategic information

In relation to output 3 (*ukuFUNda* is utilised for collecting and dissemination of strategic information), the identified an indicator was of a 'dashboard and survey information accessible to stakeholders'. The baseline was 'zero', with a target that the dashboard would be operational by February, 2015', and a means of verification that the dashboard would be accessible via a web interface. Thus, this aspect of the UVS focuses on the backend of the platform, which includes the dashboard on uptake and usage, the content management system (for uploading and editing content), and the survey functionality (for creating and administering surveys).

The UVS backend system could only be reviewed by visiting the Reach Trust offices in Stellenbosch, reportedly because of security and firewall constraints on the Mxit platform. The Reach Trust CEO commented that 'Providing VPN²³ access is not difficult, it was just that the cost of doing so, for a once off review, did not seem to warrant the effort' (Andrew Rudge, July 2016).

The UVS platform is hosted on a server making use of a SQL database (this is commonly-available proprietary database software). User registrations are queried directly from this database. No user-friendly reporting and administrator interface has yet been developed to guide interaction with this underlying database. This becomes problematic when, for example, the Dashboard app does not compensate by providing outside users full access to all requisite information that may be needed for project management and monitoring purposes, as it means that access to all relevant data is controlled by a single party through an interface that requires considerable technical expertise to navigate and can only be accessed from a specific geographical location.

23 A 'virtual private network' is a private network that can be accessed via a public network.

A concept note outlined the dashboard's purpose and expected functionality as follows:

The Mxit environment provides powerful data that can be used to closely monitor and analyse performance across a range of criteria, such as user demographics and content consumption. The data can be presented as a point in time dashboard, enabling UNICEF and the Department of Basic Education to track and measure agreed metrics. The most powerful aspect of the data is the dynamic feedback loops. Every single interaction by a user produces some form of data that can be analyse and tracked.

The partners have agreed the following indicators:

- *Number of users on the platform*
- *Number of users accessing educational resources and psycho-social support services*
- *Number of communications/messages sent by stakeholders and read by users*
- *Proposed ukuFUNda dashboard metrics:*
- *User Insights:*
- *Number of users*
- *Daily and monthly registrations*
- *Demographics (geographical, age, school and grade)*
- *Interactions Insights:*
- *Content consumption measured by:*
- *Page views - number and frequency*
- *Calendar use*
- *Group interactions*
- *Survey completion and referrals*

(Dashboard concept note, titled Development of an UkuFUNda dashboard to monitor and evaluate platform use and efficacy, no date, no author)

A dashboard (<http://41.191.127.53/dashboard/>) was developed and is accessible to those with the necessary log-in details (see Figures 16 and 17).

Figure 21 *ukuFUNda Dashboard home page*

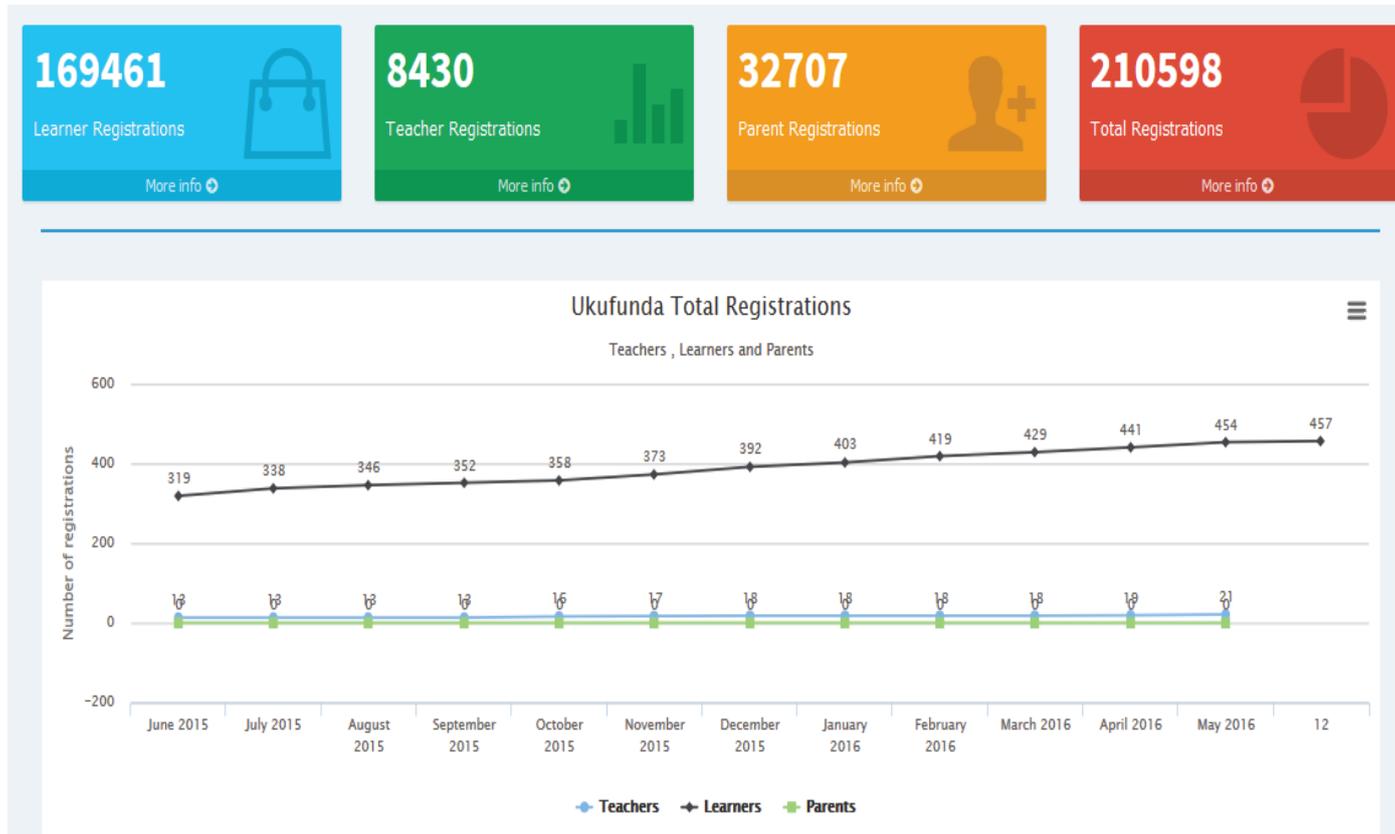
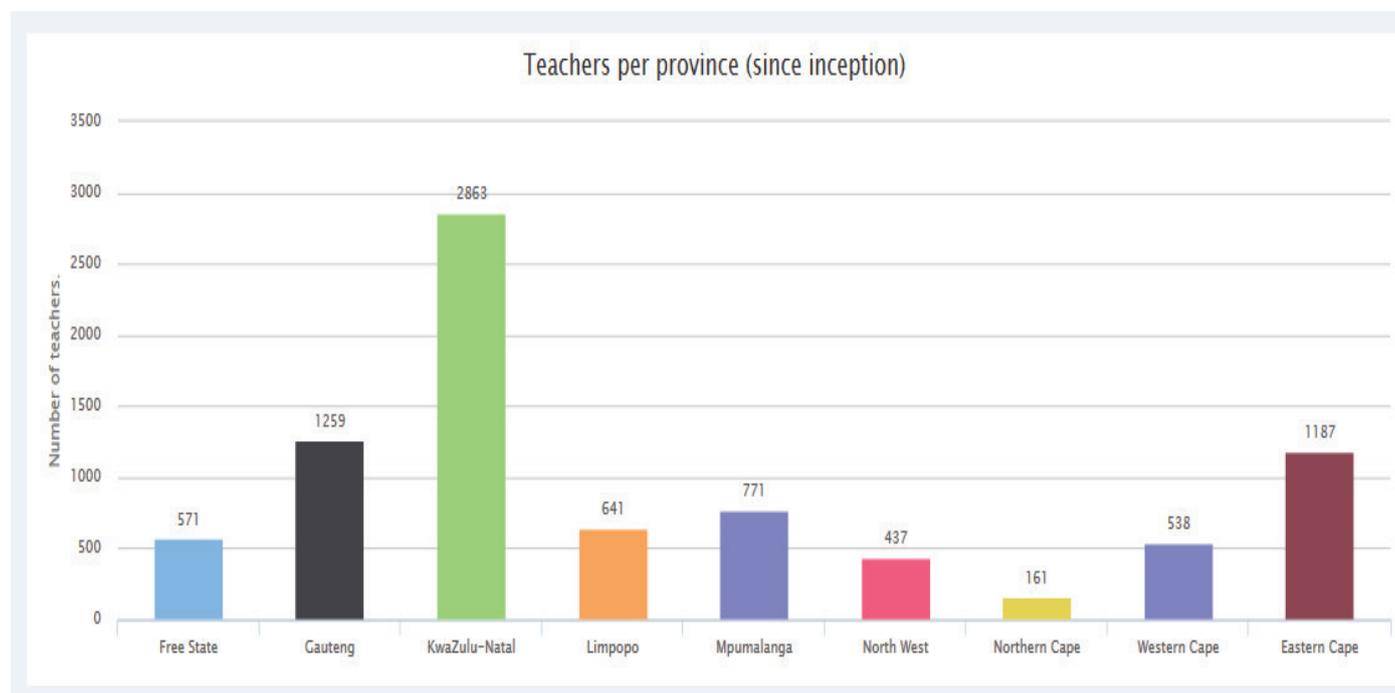


Figure 22 *Sample chart on the UVS dashboard (teachers per province, based on national data)*



The dashboard provides summary data in charts (line charts or bar charts) about the users registered on UVS (by user group) – thus only data on uptake, not usage. The data provided is as follows:

- Total registrations over time (at national level, and per province and school)
- For learners: language; age; location (i.e. province); gender; grades.
- For teachers: language; age; location (i.e. province); gender.
- For parents: age, location, gender.

Further errors are evident when considering the school-level data of the dashboard. While uptake over time is reflected correctly (with, say, nine learners registered for the service in particular school), the graphics for the national (not school) data is reflected above this. Therefore, on a single page referring to a particular school the data presents a mixture of national and school level data.

The dashboard includes only some of the data agreed in the dashboard concept note.

Table 13 *Data included in dashboard against the agreed dashboard concept note*

ukuFUNda indicators	Inclusion	Comment
Number of users on the platform	Partially	This reflects number of users registered (at any time, and not currently active users in real time or over the last month)
Number of users accessing educational resources and psycho-social support services	No	Data does not distinguish content types, or any content consumption
Number of communications/ messages sent by stakeholders and read by users	No	Data does not provide any indication of views/posts or communications to or from the service. However, there were no messages sent by stakeholders, other than Reach (Andrew Rudge, personal communication, 27 May 2016)
ukuFUNda dashboard metrics		
User Insights.		
Number of users	Yes	Registered users are shown
Daily and monthly registrations	Yes (partially)	Reflects increasing uptake of registered users
Demographics (geographical, age, school and grade)	Yes	Self-reported (and some problems evident with data validation)
Interactions Insights. Content consumption measured by:		
Page views: number and frequency	No	
Calendar use	No	
Group interactions	No	
Survey completion and referrals	No	

The CEO of Reach Trust, Andrew Rudge, explained the fact that the dashboard did not meet the agreed specifications as follows:

The original dashboard was developed with this functionality and demonstrated to UNICEF in July 2013. Unfortunately, with the long delay in launching and shift in focus to Branch T, a new version of ukuFUNda was developed. Reach no longer had access to the same technical team that built the first dashboard. When the dashboard was presented in Feb 2015, Reach thought it more prudent to wait for the funding to be extended before sourcing a new tech team to develop the full dashboard. (personal communication, 21 August 2016)

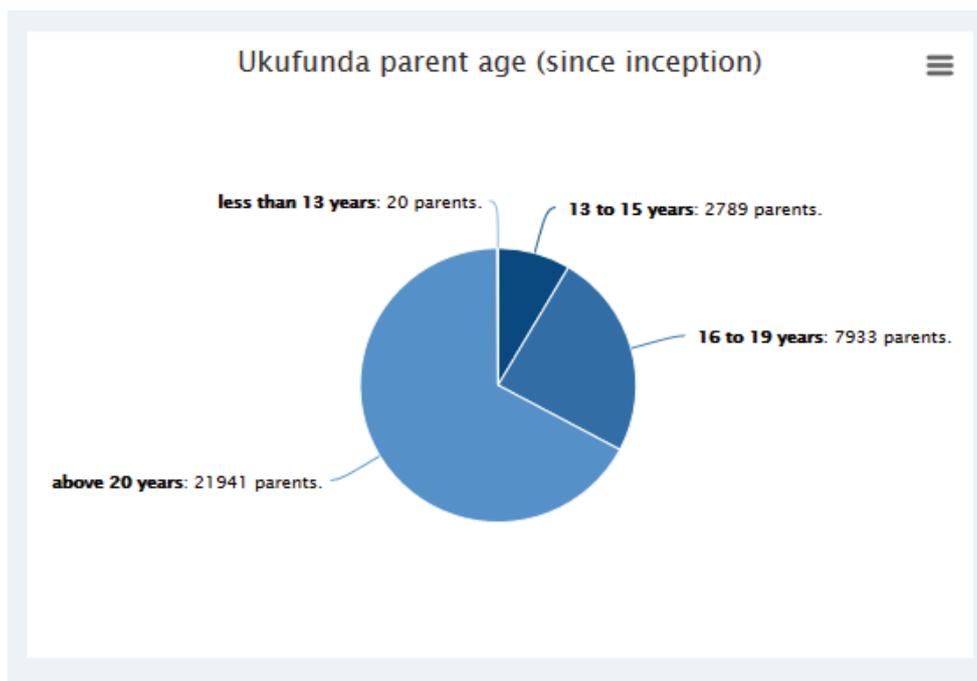
UNICEF and the DBE were not made aware that the dashboard did not meet requirements until this evaluation raised the issue.

Functionality to view and/or extract usage data easily does not appear to have been an UVS priority. No usage data was/is provided in the UVS dashboard. Usage data can be extracted from the backend by defining and running queries on tables in the SQL database, which are then exported as Excel spreadsheets, but this makes month-by-month statistical analysis quite laborious.

Review of the dashboard surfaces some problems with the data in the dashboard. By way of example, all of the parents were reflected as being registered in Gauteng and the parents' age data does not make sense, with no filters applied relating what a reasonable age would be for a parent or a teacher (see figure 18). The Reach Trust has confirmed that, in the former case, there was an error in the registration page that meant all parents were recorded by default as living in Gauteng, while the age category was pulled from the Mxit profile. Parents were not asked to update their age profile

as part of the registration process, primarily because the Reach Trust did not want to add too many steps to the process (Andrew Rudge, personal communication, 27 May 2016).

Figure 23 *ukuFUNda parent data (from dashboard in May 2016)*



Google Analytics is a free software programme offering analytic reports for websites and mobi-sites Google Analytics were available for the *ukuFUNda* teacher and learner applications. The evaluators' requests to access usage data pertaining to particular applications or content types, led to these queries being run for the first time, despite previous requests from UNICEF being recorded in the project meeting minutes²⁴. E-mail requests were made on 19th November 2014 and 8 December, 2014, as well as a reminder that the goal was to 'increase the number of registered people who will be active' on 17th February, 2015. No reason has been provided by the Reach Trust as to why the requested data was not provided to the partners²⁵. It was the lack of this type of data, together with the value of the contract and other concerns, that motivated UNICEF and DBE to commission an evaluation before providing further support to the project (Saadhna Panday-Soobrayan, personal communication, 18 August 2016).

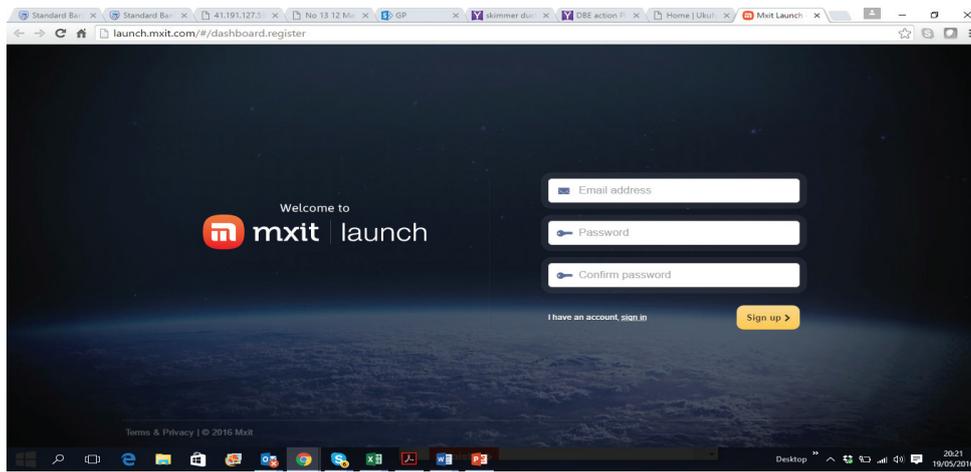
UVS Content Management System

A Mxit 'Do-It-Yourself' (DIY) application named 'Mxit launch' is used to create, edit and review content).

24 It should be noted that the Reach Trust did provide some data at the project meetings, but this was limited to uptake data (number of registrations and active users)

25 Usage was being monitored internally by the Reach Trust (Andrew Rudge, personal communication, 8 July 2016)

Figure 24 Mxit launch front page



This is connected to a Mxit DIY application builder registration page, which then leads to the content creation interface. Short pages can be authored, allowing for the insertion of text, graphics, and other media. A 'what-you-see-is-what-you-get' (WYSIWYG) interface is provided for on a computer screen, together a mock-up of a mobile phone screen (using at least two resolutions) on the right hand side. This application is branded as a Mxit application. There is no distinction between Mxit developers and development processes adopted for UVS.

Alternatively, developers can use the website <https://dev.mxit.com/default.aspx>, where it is possible to programme in C+ or PHP²⁶. This requires a web developer to have knowledge of aspects like coding, and allows for creation of apps that have greater functionality. This has been the app-building option used by the majority of third-party developers (Andrew Rudge, personal communication, 21 August 2016).

Figure 25 Home page of the Mxit developer site



The Reach Trust technical team reported that third party service providers (such as Mindset Learn or FunDza) made use of the 'Mxit launch' interface to upload their pre-existing content. The Reach Trust technical team was not involved in third party content creation processes, so content creation, maintenance, monitoring, and updating was the responsibility of the third party content providers.

UVS Survey functionality

Some surveys were completed by Pondering Panda, as per the PCA, prior to the evaluation period. These were relevant as they informed the rationale for including survey functionality into the UVS specifications. A consolidated 'Pondering Panda Youth Report' was developed, which drew on the following surveys conducted between June, 2013 and January, 2014.

Pondering Panda Surveys	Respondents
Education in South Africa Survey - November 2012	7,324
Bullying in South African schools - January 2013	2,065
Youth Hope Index - June 2013	8,349
Keeping Our Children Safe - June 2014	3,469
Holiday Survey - Learner behaviour during the October holidays	251

A document was created by the Reach Trust to guide officials on how to write a survey. However, there was no evidence of survey functionality built into the UVS system that would enable DBE or UNICEF officials to make use of the survey function through remote access to a survey tool interface. As there was no survey app/tool, this needed to be done manually by the Reach Trust for each survey, with the administrator creating the questions liaising with the technical team via e-mail or other means. Survey functionality had previously been provided by Pondering Panda, and when Reach Trust administered surveys the DBE questions were submitted manually to Reach.

This section of this chapter provides a summary of the findings of the evaluation which are organized according to the agreed evaluation focus areas:

- Effectiveness;
- Efficiency/cost effectiveness;
- Relevance; and
- Sustainability.

Effectiveness

Effectiveness is considered in relation to the intended effects as outlined in a theory of change and/or related logic model (theory of action). Effectiveness is considered in terms of perceptions of effect, as well as measurable uptake and usage of the service, and related impact on learning attainment (as specified in the theory of change). We begin by exploring stakeholder perceptions of effectiveness.

Stakeholder perceptions of effectiveness

Project partners were asked to rate their responses to a series of statements. Several partners chose not to comment on particular statements, as they felt they lacked data to respond, and felt that they ought to distinguish potential from actual effectiveness but lacked empirical data on which to base their judgements. For this reason, some of the rows in the table below do not sum to 9 (n=9).

Table 14 *Summary of responses of project partners to questions on effectiveness (n=9)*

Effectiveness (project partners, 9) (1=strongly disagree, 2=disagree; 3= neutral; 4=agree; 5=strongly agree)	1	2	3	4	5
I believe that the current reach of the UVS (in terms of learners) is an excellent achievement	1	3		3	
I believe that the current reach of the UVS (in terms of teachers) is an excellent achievement	4	1		2	
I believe that the current reach of the UVS (in terms of parents) is an excellent achievement	2	1	1	1	1
I believe that the UVS is a fantastic resource.			2	2	5
I believe that the UVS is effective in improving the academic performance of high school learners.	1		3	2	1
I believe that the UVS is effective in improving the psycho-social well-being of high school learners.			3	4	1
I believe that the UVS is effective in assisting high school teachers to do their job better.	1	1	3	3	1
I believe that the UVS is effective in assisting district officials (e-learning coordinators, curriculum advisors, circuit managers etc.) to do their job better.	2		4	3	
I believe that the UVS is effective in improving the ability of parents to support their children better.			3	4	1

The above table shows that project partners believe strongly that UVS is a ‘fantastic resource’, and are generally positive about the effectiveness of the virtual school in improving the psycho-social well-being of high school learners; and in supporting teachers in their job and parents in their role. Their views on the current ‘reach’ of the service is, however, generally negative – especially in the case of teachers.

Some project partners felt that they were not able to comment on reach as there had no comparisons to other applications. Likewise, impact on academic performance could not be measured as there was no data to support this. One project partner commented that there were good resources, although these were not always used, while another noted that the UVS had potential. It was also noted that statements like ‘UVS was a fantastic resource’ were very broad and did not define particular aspects of the service in detail or define what may be referred to as ‘fantastic’. These statements were included in the interview instruments as a way of gauging the general perception by project partners of the overall service.

When asked about their expectations of the UVS uptake (Has the uptake and use of your app on the UVS been as you expected when you joined?), project partners’ responses were varied. Some said no (‘It was not very effective’), others said yes (‘use has been good considering that it was not actively marketed’), and others provided a mixed response (for example, ‘The uptake was initially very good, but decreased significantly as students migrated to smartphones and no longer used the Mxit platform.’). Two respondents noted that they were not able to answer the question since they had not received usage data (‘We haven’t seen proper stats for this.’).

Seven app/content service providers responded to five statements about the effectiveness of the UVS on a Likert scale running from strongly disagree to strongly agree, as shown below.

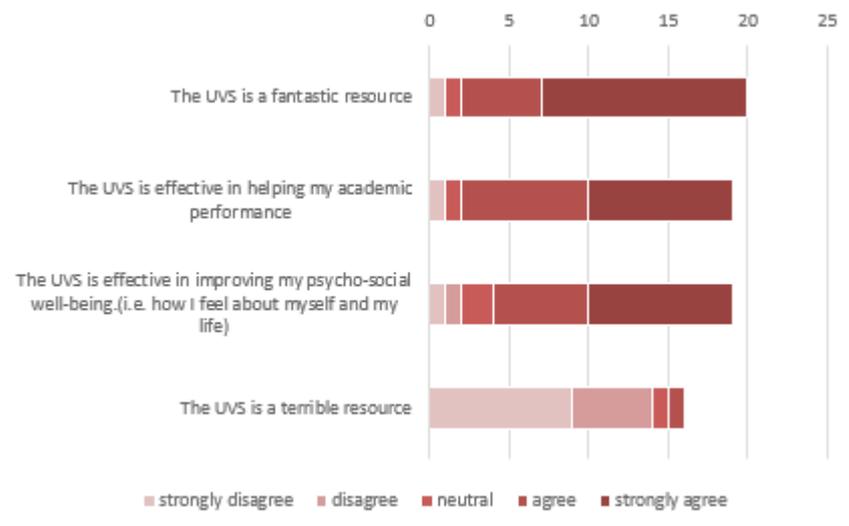
Table 15 *Summary of responses of app/content service providers to questions on effectiveness (n=7)*

Effectiveness (app/content service providers, n=7) (1=strongly disagree, 2=disagree; 3= neutral; 4=agree; 5=strongly agree)	1	2	3	4	5
I believe that the UVS is a fantastic resource .			1	5	1
I believe that the UVS is effective in improving the academic performance of high school learners .			2	5	
I believe that the UVS is effective in improving the psycho-social well-being of high school learners .		1	2	2	2
I believe that the UVS is effective in assisting high school teachers to do their job better .		1	3	3	
I believe that the UVS is effective in improving the ability of parents to support their children better .		1	2	4	

These responses can be considered a generally positive affirmation of the UVS in that 22 of the 35 app/content service provider responses (63%) were either ‘agree’ or ‘strongly agree’, and only three (9%) were negative (‘disagree’).

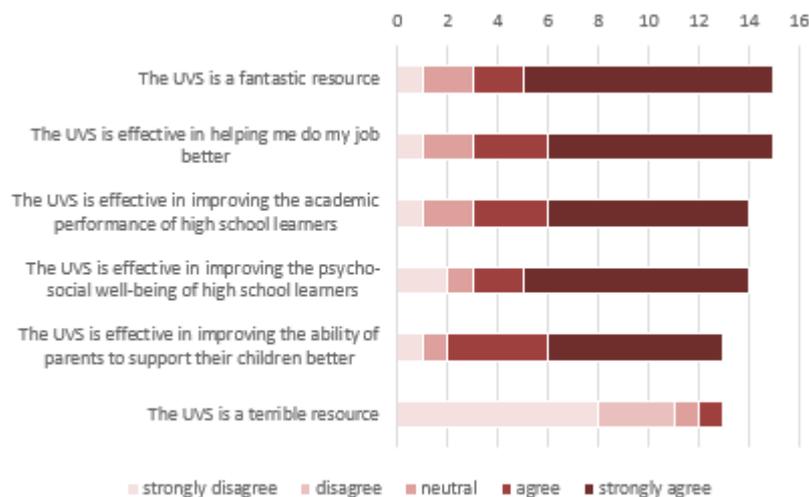
Teachers and learners were asked to respond to a series of statements in the survey according to a Likert-scale set of options, as shown below. Only graphs for the learner and teacher groups are presented because, due to a technical or logic error, responses to these questions were not collected for parents.

Figure 26 *Learner comments on the effectiveness of the UVS (n = 16 to 20)*



For learners, the only statement with relatively lukewarm responses was ‘The UVS is effective in improving my psycho-social well-being’.

Figure 27 *Teacher comments on the effectiveness of the UVS (n = 13 to 15)*



For both the learner and teacher groups, responses to these statements indicate a positive attitude towards the UVS, with the respondents typically providing ‘agree’ and strongly agree’ responses.²⁷ Learners’ responses were, on the whole, slightly more positive than those of teachers.

Main strengths of the UVS

Some strengths were mentioned by members of at least three of the stakeholder groups. First, the UVS was accessible on cheaper phones (feature phones) opening it to a wide audience. Second, the UVS was data-light and so using it was more affordable. As one app/content service provider noted, this meant it ‘can reach people who need it most on the very margins of society’. Third, the UVS adopted a holistic approach covering both psychosocial support and academic learning materials. As one TCM observed, there is ‘something for everyone’. Similarly, a teacher in the case study focus group felt very happy that the service was not only focused on academic matters but also on the ‘whole aspect of life’. Fourth, UVS curated a variety of apps. As one service provider noted, ‘it provides the user access to various educational apps within a central app. These may be apps which a user could miss if searching for it on their own in Mxit’.

Other strengths were identified, but on fewer occasions and from at most two stakeholder groups. For example, project partners felt that a strength, at least initially, was that the Mxit platform was popular and appealed to young people, while the backend provided the potential to track uptake and usage data and get feedback from teachers, learners, and parents. Some teachers (and some project partners) were positive about the potential of the UVS for teacher communication and supporting communities of practice. A member of the teacher centre case study focus group observed that the content of the apps is ‘solid’, while two teachers at the case study school noted that the UVS enabled learners to access examination papers and memos and teachers to access extra information for use in the classroom.

Learners at the case study school were appreciative of the fact that the service provided them with information to which they would otherwise not have access (for example, past examination papers, information on careers, and the requirements for studying certain courses). Further, some of the case study school learners felt that the UVS allowed them to ‘catch up’ after class, which was important as many of their classes contained over 150 learners, so they were seldom able to get individual assistance. Two learners said that it provided support and advice for everyday life. For example, their nearest clinic is ten kilometres away, but the MyChoma app allowed them to get health advice one-on-one and in an anonymous way, so that private matters could be discussed openly. In addition, they enjoyed learning using technology (‘a book is boring but a phone is fun!’).

²⁷ The one exception is, of course, the responses to the statement ‘the UVS is a terrible resource’, where the overwhelming responses were either ‘disagree’ or ‘strongly disagree’; thus, as before, indicating a positive attitude towards the UVS.

Main weaknesses of the UVS

Some weaknesses were mentioned by at least members from at least three of the stakeholder groups. First, UVS needed to be accessed via Mxit. As one of the app/content service providers noted, 'it was linked to Mxit which is perceived to be dying'. Respondents in the teacher's centre focus group put it this way: Mxit has a 'primitive connotation' with learners and teachers, which means they are 'not eager' to use it. Learners especially saw it as an outdated platform; they are looking for new, 'more hip' names. As one observed, 'the content is good, the 'shell' [Mxit] is the problem'. Second, the UVS was reportedly not easy to download and use. Third, once downloaded, the interface/navigation process was not user-friendly, involving too many steps and menus to locate specific services and apps. Fourth, although the service was relatively affordable to use, it still requires data, and it was observed that not everyone has access to money to afford data bundles.

One member of each the teacher's centre and case study school learners' focus groups felt that the mobile display was too small, and therefore it was difficult and tiring to read the material provided. Respondents from the teacher centre focus group identified a number of additional weaknesses of the service. They noted that there were technical problems with the service. One ELC struggled to get Mxit on their phone, while another noted that Mxit did not allow them to register as a teacher. Yet another said that he went to market UVS at a local school, and, even with two technicians present, technical problems were experienced getting learners onto the UVS. Second, it was observed by three teacher centre respondents that the training received was a 'bad experience'. Specific training problems reported included: the training group being too big; difficulties sourcing help when needed; training lasting only one hour, which was insufficient; and trainers all being technical people, who did not 'speak the language' of the teachers they were training. Third, a weakness noted by one teacher's centre focus group member was that all the apps were in English, thus neglecting other South African languages.

Two app/content service providers highlighted the limitations of UVS's text-based platform. For example, one noted that 'we cannot always send URLs, because Mxit doesn't work well with symbols. We cannot send pictures. It is tricky to help a child with maths or science on Mxit'. However, the Reach Trust CEO pointed out that concerns about not working well with symbols were 'misconceptions', explaining that 'it was (and still is) possible to send both URLs and mathematical symbols in Mxit' (Andrew Rudge, July 2016).

Three learners in the focus group at the case study school observed that many apps do not allow for personal feedback and that they would have liked to be able to ask questions of things they do not understand, and get a reply. One also noted that queries on the MyChoma app often took a long time to receive replies.²⁸

Project partners identified various weaknesses not mentioned by other groups. These typically related to broad, overarching concerns rather than concerns with the service itself. It was noted that the UVS lacked a theory of learning, a theory of change and the parameters of what was intended were not explicit and kept changing. Likewise, a weakness reported was that the UVS did not have a tightly defined target and purpose; it tried to be 'everything for everybody'. In addition, the UVS plan was described as over-ambitious, while what was developed was not fit-for-purpose. It was also observed that the UVS was insufficiently trialled, and its implementation insufficiently monitored. The service required integration within the DBE processes, and strong coordination within the department to attain this, which was reportedly lacking and partnership approval processes were slow. Finally, the service was reportedly not marketed sufficiently to the target audience.

Weaknesses identified by teachers in the case study school focus groups were less about the UVS than problems with access to the service, including lack of money to buy airtime, lack of a suitable type of cellular phone, and network and electricity access problems. One teacher also observed that she did not like technology. Clearly these problems cannot be placed at the door of the UVS itself.

Finally, some project partners distinguished what was effective in theory from what transpired in practice. For example,

²⁸ The MyChoma team was originally too small to cope with the large volume of queries. This has been rectified more recently by SoulCity [Andrew, Rudge, personal communication, 9 June 2016].

much hope was placed in the teacher communication components which were meant to link to communities of practice, but ultimately they failed to do so. Some respondents considered the dashboard to have potential in theory, but disappointment was expressed regarding how this worked in practice, because the data presented concerned only uptake data and did not give a sense of which content was being used or of patterns of usage over time.

Recommended changes to the UVS

There was general consensus amongst all stakeholders that the UVS should be changed so that it does not need to be accessed via Mxit. Suggestions for alternatives included developing the UVS as a stand-alone app, a mobi-site, and having it hosted on Facebook.

Members of teacher centre focus group agreed that the service needs to be made more useful to teachers and learners. For example, according to one TCM, teachers 'want the fruit salad already mixed and ready for class': ready-made apps that mean a user does not need to look hard to find what is needed. Two members requested that academic material should be more CAPS-aligned and directly relevant to the curriculum outcomes (though this observation seems incongruous since many of the academic apps are just that).

Two members of the teachers' centre focus group felt that priority needs to be given to overcoming the technical problems. In addition, all agreed that any training of teachers should be with a team that includes both technical and educational people (not just the former, as was sometimes the case). Finally, all felt that zero-rating the service is important, as mass uptake amongst the poor will happen only if the data is free²⁹.

Two learners at the case study school requested more personal (one-on-one) assistance with questions, and one asked that UVS become 'more like whatsapp' (for example, providing more chat opportunities, allow a user to see when people are offline, and linking contacts automatically).³⁰

Some app/content service providers made requests that related to their role as content providers, such as on asking for each of the following: a simple rating system for apps; a stronger relationship between Mxit and the content providers; and better marketing so as to make the 'value offering' to the beneficiaries clearer.

In terms of new content, few views were expressed by the respondents. Two teachers at the case study school felt the UVS should offer a greater variety of subjects and provide study guides, whilst the application most frequently mentioned by project partners as needing to be added to the UVS was a teacher communicator app.

Effects as evident in uptake of UVS

In relation to output 2 (Educators, learners and parent use virtual school), the identified indicator in the Results Matrix was 'the number of learners, teachers and educators using *ukuFUNda*', with a baseline of zero and the following targets:

- 2015: 40,000 learners, and 450,000 teachers (approximately 10% of the target population) and 40,000 parents
- 2016: 1 million learners, and 100,000 teachers; and 100,000 parents.
- 2017: 200,000 teachers, 2 million learners, and 200,000 parents.³¹

It was expected that monthly active user data would be generated by the UVS system and that this would be measured monthly.

29 Originally all of Mxit – including *ukuFUNda* – was zero-rated by Cell C, but this was discontinued in early 2015 (Andrew Rudge, personal communication, 21 August 2016)

30 According to the Reach Trust CEO, the service already facilitates these requests (Andrew Rudge, personal communication, 9 July 2016)

31 No targets were reported in the PCA agreement and the Results Matrix was the framework against which the project partners agreed should be used as the basis for this evaluation.

In summary, by the end of December 2015, the UVS had the following numbers of registered users: 150,321 learners; 7,290 teachers; and 21,463 parents (who came from 8,809 different schools). However, uptake data is reported in two ways, first by how many users ‘touched’ the service (at least landed on the home page) and, second, the in terms of number and profile of users registering for the service. Registered users are required to complete a few questions before accessing the service and are therefore likely to be more motivated to use the service than those who simply land on the homepage or touch an application in some way but do not register for the UVS.

Based on data measuring messages to and messages from the service for the evaluation period, 1,048,576 users interacted with the service in some way, sending and/or receiving at least one message on the service³². Of these, 179,074 (17.1% of the total) took the additional step of registering for the service. Table 15 indicates the total number of registered users for each user group³³.

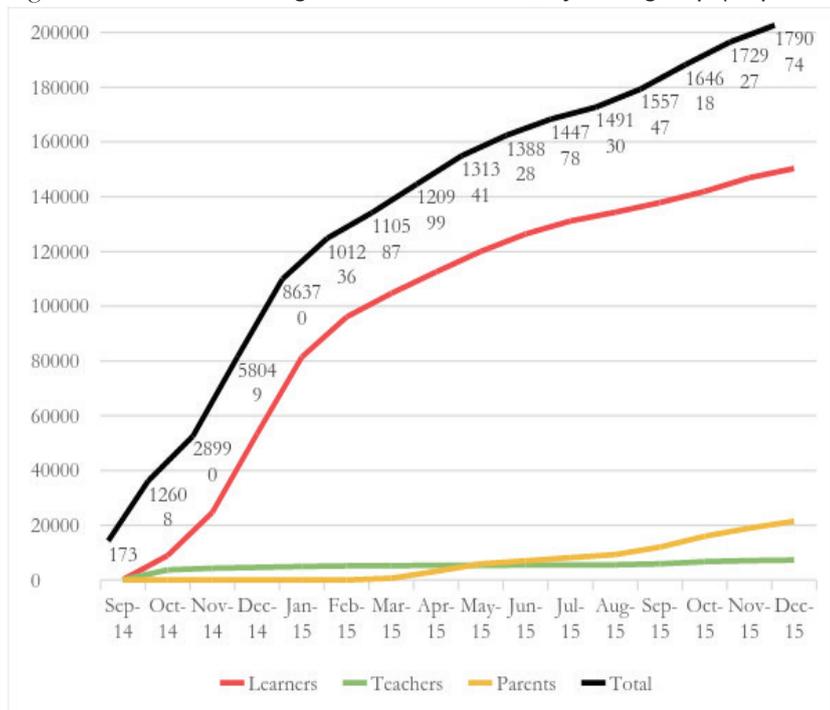
Table 16 Total numbers of registered users, by user group (December 2015)

User group	Number of registered users	Target	Percentage of target
Learners	150,321	250,000	60%
Teachers	7,290	60,000	12%
Parents	21,463	No target set	n/a

By comparison, there are 46,780 registered users³⁴ for the *Microsoft Math* online service. While the UVS service was marketed via Mxit, the *Microsoft Math* service was marketed through SchoolNet South Africa's activities and through the evaluation process in 2014/15 (but that involved only ten research schools). The uptake for learners on UVS can therefore be considered good in comparison to *Microsoft Math*.

Figure 23 presents cumulative registrations over the evaluation period to offer a sense of how the registered user base grew over time:

Figure 28 Cumulative registrations over time, by user group (September 2014 to December 2015)



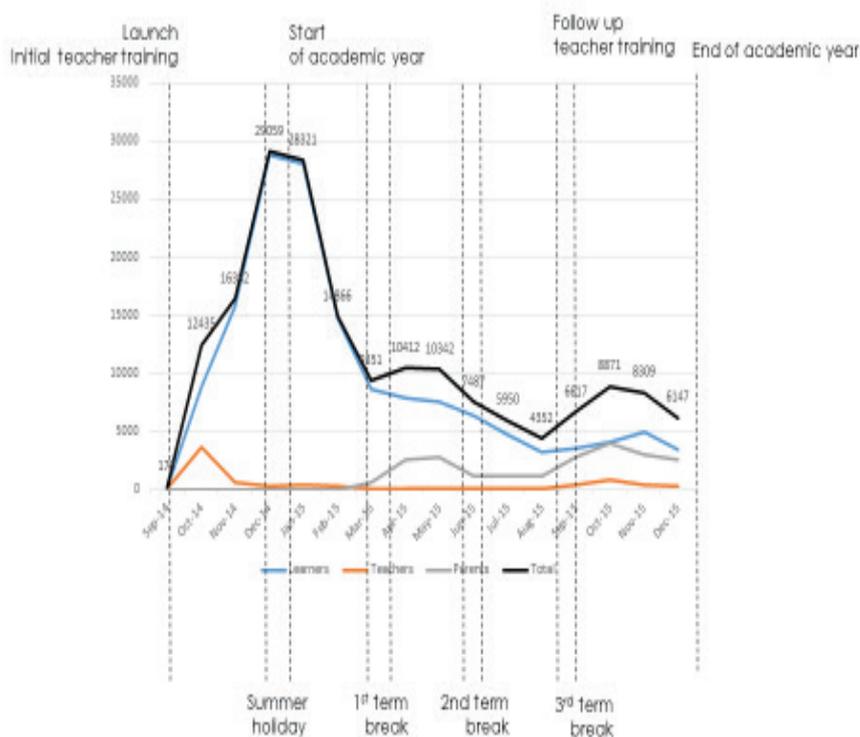
32 These ‘messages’ should not be understood as an overt form of communication between the user and service. For example, if a user landed on the *ukuFUNda* home page, without doing anything else, that visit was recorded as one message to the service.

33 By 29 March 2016 the registrations had increased to 165 559 learners, 7 941 teachers; and 29 295 parents who came from 8 863 different schools.

34 Figures as at end of January 2015.

There has been a steady increase in registrations, with most users registering as learners. Uptake amongst teachers took place primarily after the launch in September 2014, with very few new registrations thereafter. Uptake amongst parents occurred from April 2015 after their app was launched, and shows more consistent growth than amongst teachers. The uptake pattern over time considering the number of registrations in each month provides a clearer sense of registration activity over the evaluation period:

Figure 29 Number of registrations by month and user group (September 2014 to December 2015)



The above graph indicates, unsurprisingly, that most users are learners. Far greater learner enrolment was evident immediately following the launch (October, 2014 to February, 2015) than at any other time. This may be due to initial excitement in gaining access to a new educational service. Learner registration declined sharply after this initial period, but a relatively steady learner uptake of an average of 4,000 new learners per month from July to December, 2015 was evident³⁵.

There was a notable, though modest, peak of teacher uptake after the initial launch (September 2014), which coincided with ELC and TCM training. As with learners, this initial uptake may be due to initial enthusiasm in a new e-service. There is a smaller, secondary peak of teacher registrations in September and October 2015, following further e-learning coordinator training. Uptake amongst parents shows greatest uptake in April-May 2015 (immediately after the launch of the parent app) and then again in October-November 2015. The reason for the second parent registration peak is unclear, although it may be related to SGB elections.

Speculatively, factors that may have influenced teacher and parent take-up of the service include the following:

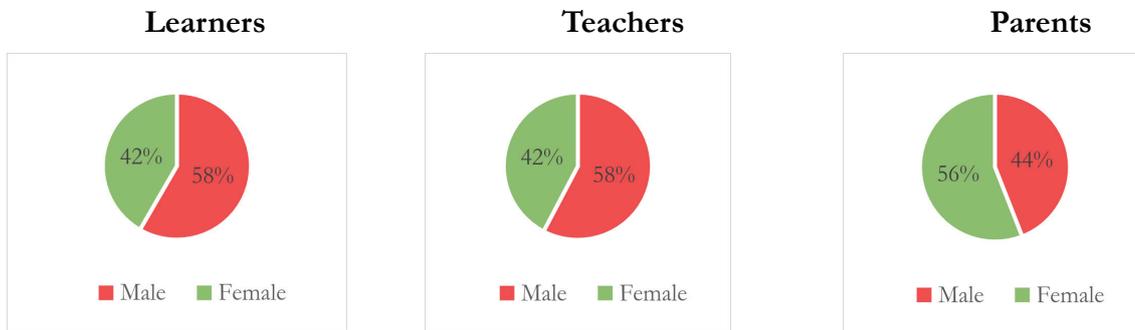
- These two groups are older and have fewer technical skills than the learners. As such, they were less likely to be Mxit users and more likely to be reluctant to try out new innovations.
- Apps in the virtual school do not appear to be well integrated with DBE programmes.

³⁵ This needs to be seen in the context of a rapidly declining Mxit user base: end of 2012 = 10 million users (2nd biggest category = 13-18 year olds). Sept 2014 = 4.9 m users. May 2016 = 0.6 million.

- Marketing to teachers and parents was insufficient for large-scale uptake. This could well be a primary reason, as it has been confirmed that dedicated resources were not allocated to drive uptake amongst teachers and parents (personal communication, Shafika Isaacs, 1 August 2016).

Registration data provides further information pertaining to the profile of the UVS user base in relation to gender, school, grade, home language, and provincial distribution.

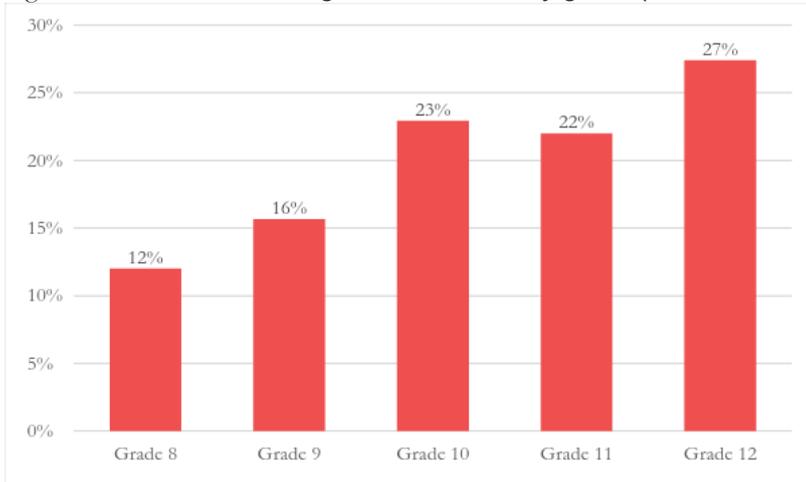
Figure 30 Gender of registered user-base



Registered users for both learner and teacher groups are skewed slightly towards males, while there are more female than male parents registered for the service. The overall Mxit registration by gender is 54% male and 46 % female for both learners and teachers.

In terms of the grades of the learner users, all were secondary school learners – thus reflecting the focus of the service. The highest uptake was amongst Grade 12 learners, and in total 72% of the learners were in the FET Band (Grades 10 to 12)³⁶. The preponderance of learners in these grades on the platform is likely to be because the majority of the apps on the UVS are targeted to that grade level, and because older learners are more likely to have access to cellular phones and data.

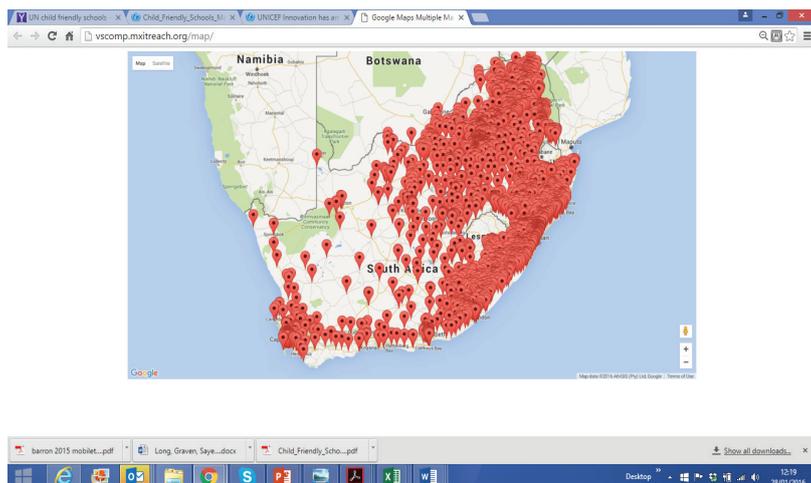
Figure 31 Distribution of registered learners by grade (n=146 070, December 2015)



The map below shows the distribution of schools which have individual users registered with the virtual school. Clearly, the UVS has penetrated right across South Africa, with the only gaps evident in sparsely-populated parts of the Northern Cape.

³⁶ These represent the Grades of learners in 2015.

Figure 32 *Distribution of schools registered with ukuFUNda*
 Source: <http://vscomp.Mxitreach.org/map/>



It should be borne in mind that a school does not register with the UVS, but rather individuals register (and choose their school from a drop down list of options).

Table 16, showing the number of users (learners and teachers) per school, is shown below.

Table 17 *Number of UVS users registered at particular schools (as at 31 December 2015)*

No. of users	No. of schools
1	1102
2	747
3	573
4	497
5	409
6	347
7	305
8	251
9	236
10	225
11	207
12	188
13	189
14	141
15	143
16	134
17	136
18	123
19	106
20	108
21-25	421
26-30	372
31-35	285
36-40	244
41-50	388
51-60	270

No. of users	No. of schools
61-70	189
71-80	128
81-90	81
91-100	51
101-125	60
126-150	22
151-200	8
>200	10

This table shows that by the end of 2015 there were 8 696 schools with registered users (teachers and learners combined). The lower quartile is three users per school, the median nine users per school, and the upper quartile 23 users per school. Thus, 25% of the schools on the list had three or fewer users, 50% had nine or fewer users, and 75% had 23 or fewer users. Thus, UVS users are spread across numerous schools, with relatively few pockets of high uptake within a single school.

There were ten schools with more than 200 users, as shown in the table below.

Table 18 *Schools with over 200 total registered users (as at 31 December 2015)*

	Type of school	Province	Learner users	Teacher users
School 1	Public	EC	720	5
School 2	Public	EC	667	35
School 3	Indep	KZN	550	11
School 4	Indep	WC	496	32
School 5	Public	WC	403	18
School 6	Public	KZN	247	12
School 7	Public	KZN	221	4
School 8	Indep	WC	194	24
School 9	Public	KZN	209	1
School 10	Indep	Mpuma	188	13

Six of the ten schools with the highest uptake are public schools, and four are independent. The latter is surprisingly high considering that fewer than 10% of the schools in the country are independent. It is unclear whether this is an accurate reflection of relatively high uptake at independent schools. The data is called into question somewhat by a call made by the evaluators to the principal of one of these schools, where she explained that, at a staff meeting, she had asked which of the teachers was registered on UVS and not a single one was – yet the data provided showed 32 teachers at that school on the service.

The power of direct marketing in getting learners to sign up is evident in the top school (in terms of uptake), which was the Eastern Cape School included as a 'best case' example. Staff from the Reach Trust visited the school twice to encourage learners to sign up for the UVS.

Provincial distribution of users is presented in Table 18 below.:

Table 19 *Provincial distribution of registered user base*

	Learners	Teachers	Parents	Target population (high school learners)	Proportion
Northern Cape	2%	2%	0%	94 009	2.0%
North West	5%	5%	0%	268 792	5.9%
Free State	7%	7%	0%	242 532	5.3%
Mpumalanga	9%	9%	0%	396 764	8.6%
Limpopo	9%	7%	0%	707 711	15.4%
Western Cape	9%	7%	0%	361 147	7.9%
Gauteng	14%	15%	100%	774 422	16.9%
Eastern Cape	15%	15%	0%	640 820	14.0%
K w a Z u l u - Natal	33%	34%	0%	1 107 300	24.1%
Total	145 522	7 156	22 463	4 593 497	100%

A third of the learners are from KwaZulu-Natal (KZN), whose learners constitute only one-quarter of the target population. This might be a consequence of greater marketing in that province, although there is no information provided to the evaluators that suggests this.³⁷ More likely, therefore, it is because, from 2014, most Mxit users came from KZN and the Eastern Cape, since it was in the rural communities of those two provinces that few learners had smart phones, and so relied on Mxit (Andrew Rudge, personal communication, 7 April, 2016 and 13 July, 2016).

The data for parents indicates that 100% of registered parents were based in Gauteng, but this is extremely unlikely. Thus, it seems safe to assume that this reflects a technical error in the data collection³⁸.

Table 20 *Home languages of registered learners and teachers*

Language	Learners (n=149,024)	Teachers (n=7,290)
English	63%	27%
isiZulu	14%	31%
isiXhosa	8%	16%
Sesotho	4%	7%
Afrikaans	3%	4%
Tswana	2%	5%
Northern Sesotho	2%	3%
Tsonga	1%	3%
Siswati	1%	2%
xiVenda	1%	1%
Other	1%	1%
isiNdebele	1%	1%
Total	149 024	7 290

The high proportion of learners who stated that English is their home language (63% of the total) seems incongruous, given other data available about the types of learners using the UVS. Conceivably, this might either be due to a technical error in data collection or because learners indicated that English is their home language. If caused by the latter, possible explanations might be either that they were responding to questions written in English or because English is

37 One possibly significant marketing event is that SchoolNet hosted a teacher conference in KZN in July 2015 where the virtual school, including the *ukuFUNda* teacher communicator, was showcased. Also, there was some marketing of the virtual school through the PILO project, although only in small amounts (Andrew Rudge, personal communication, 7 June 2016).

38 This error has subsequently been fixed (Andrew Rudge, personal communication, 27 May 2016).

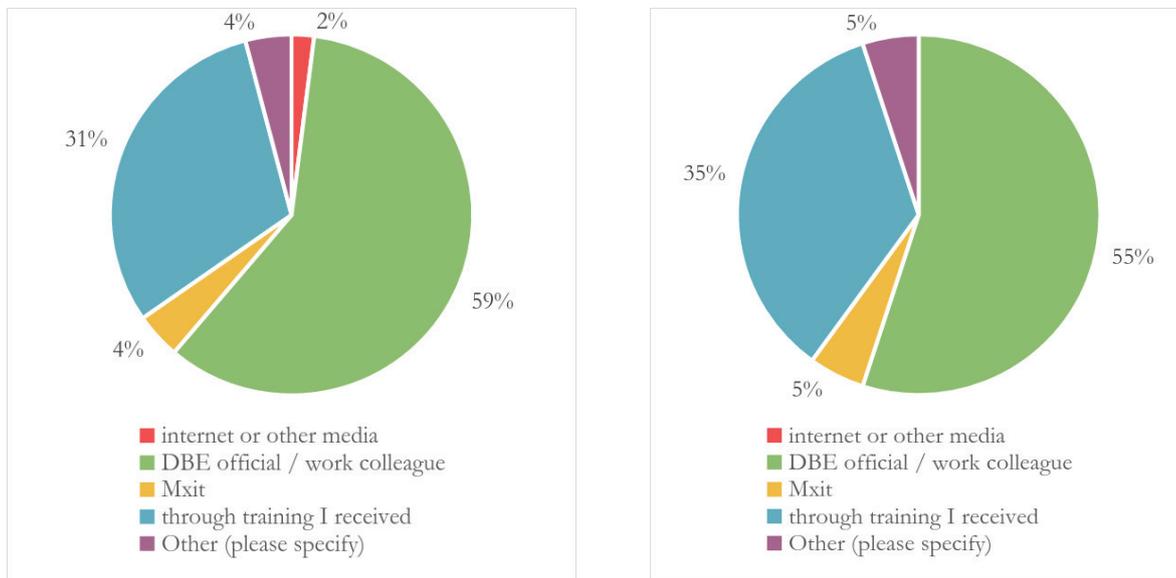
the language of teaching and learning at their schools.³⁹

The high proportion of isiZulu spoken amongst the teachers (31%) correlates well with the high proportion of registered teachers from the KwaZulu-Natal province.

How intermediaries became aware of the service (and reasons for not using it)

Intermediaries were asked 'How did you first hear about the UVS?' The responses for each group are shown below.

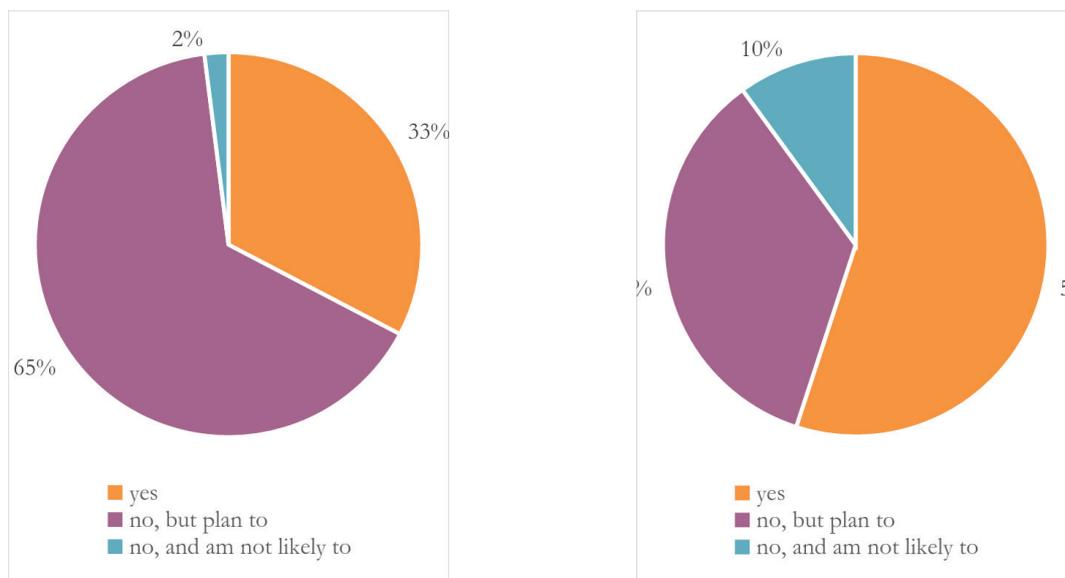
Figure 33 *How TCMs learnt about the UVS (n = 49)* Figure 34 *How ELCs learnt about the UVS (n = 20)*



TCMs and ELCs mostly heard about the UVS in much the same ways: over 50% by means of a DBE official or work colleague or otherwise (about one-third) through training they had received. Very few heard of the virtual school through Mxit, the internet or other media, or other means.

The second question asked each respondent whether or not they had registered for the virtual school. The responses are shown below.

Figure 35 *TCM registration on the UVS (n = 49)* Figure 36 *ELCs registration on the UVS (n = 20)*



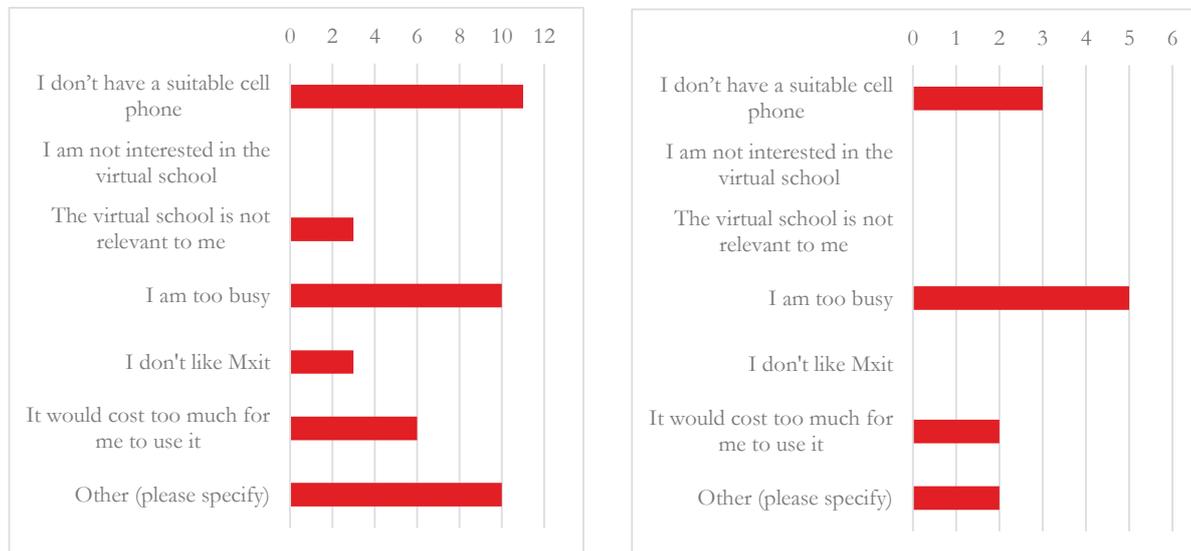
Not surprisingly, considering their official role, a higher proportion of ELCs (55%) than TCMs (33%) were registered on

³⁹ This was apparently not unusual, as, in Mxit surveys learners commonly give English as the home language when it clearly is not (Andrew Rudge, personal communication, 7 April 2016).

the UVS platform. In both case, the majority of those not registered said that they planned to, while very few indicated that they are unlikely to register.

For those who responded with a 'no' to the previous question, the follow up was to ask them for the reason(s) for this. The responses are shown below.

Figure 37 TCM reasons for not registering on the UVS (n = 31) Figure 38 ELC reasons for not registering on the UVS (n = 9)

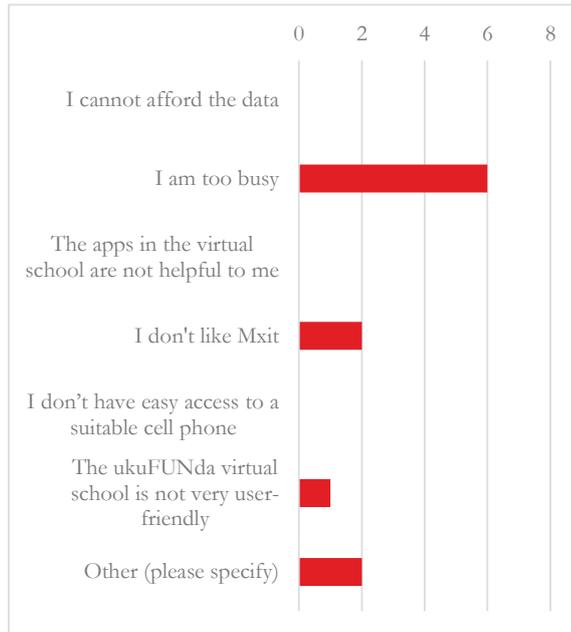
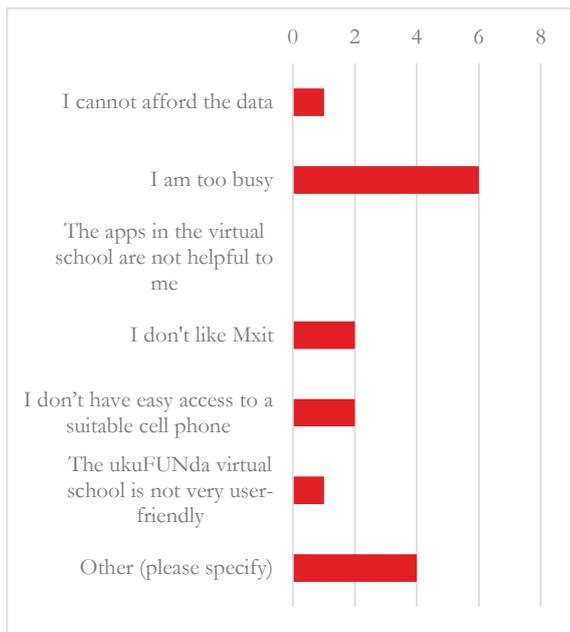


With TCMs, the three most commonly stated reasons cited for not registering with the service were lack of a suitable cellular phone (eleven responses), being too busy (ten responses), and prohibitive cost (six responses). There were also several 'other' responses, varying from statements indicating a lack of knowledge about the service (four responses, for example, 'it is not clear what it is about') to technical problems (three responses, for example, 'I struggled to download Mxit on my phone').

In the case of the ELCs, being too busy was the most common reason provided for not registering (five responses), followed by the lack of a suitable cellular phone (three responses), and prohibitive cost (two responses).

The final question for all those who had registered for the service was 'what has held you back from logging in more often to the UVS?'

Figure 39 *Hindrances to TCMs logging into the UVS* (n = 15) Figure 40 *Hindrances to the ELCs logging into the UVS* (n = 10)



The most common response for both groups was 'too busy' (six responses for each group). Other responses chosen more than once included: 'I don't like Mxit' (four responses); 'I don't have access to a suitable cellular phone' (two responses), and 'the UVS is not very user-friendly' (two responses).

How beneficiaries became aware of the service (and reasons for not using it)

Beneficiaries were asked how they had first heard about the UVS. The answers are shown separately below for each group.

Figure 41 *How learners heard about the UVS* (n = 90) Figure 42 *How teachers heard about the UVS* (n = 22)

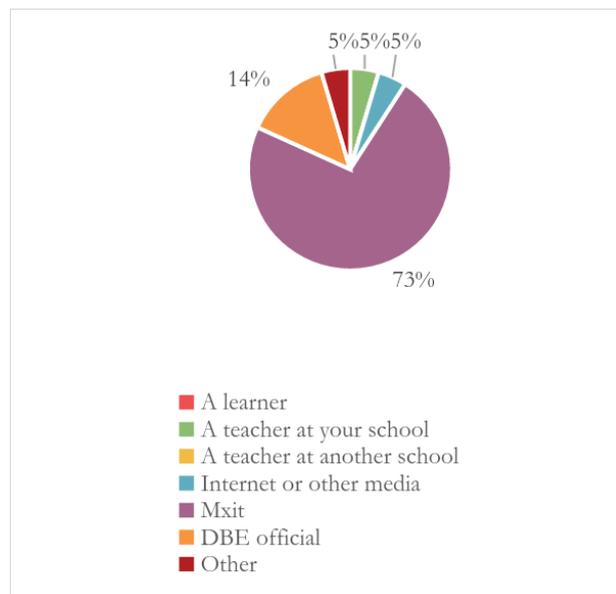
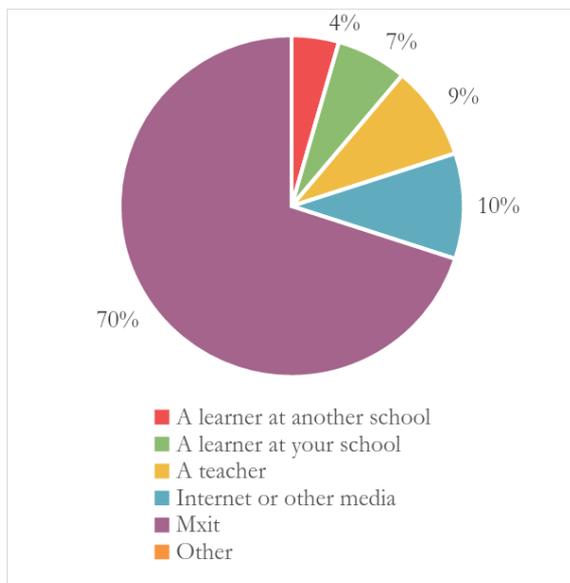
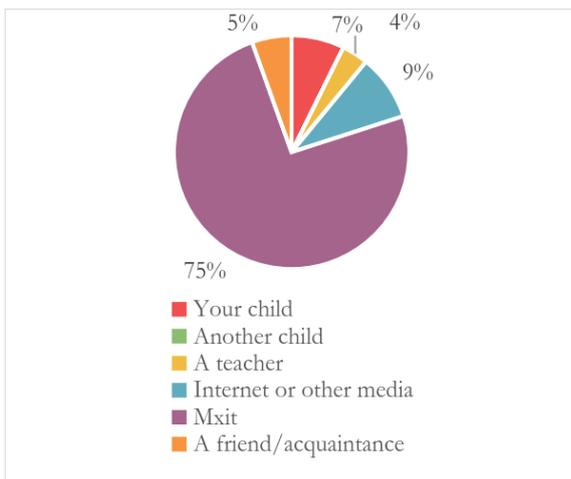


Figure 43 How parents heard about the UVS (n = 56)



For all three beneficiary groups, the most common source of knowledge about the service was through Mxit (70-75% for all groups). The second most common for learners and parents was the internet or other media (10% and 9%, respectively), while, for teachers, it was a DBE official (14%). Thus, comparatively few respondents heard about the UVS from family members, peers, or colleagues.

The learner focus group at the case study school included Matric learners. When asked about whether they felt that UVS usage was growing or declining at their school, they all agreed it was declining. This was primarily, they opined, because the service was offered on Mxit, which was 'old' and had been supplanted by new apps. They felt that Mxit needed to 're-invent' itself and market itself more.

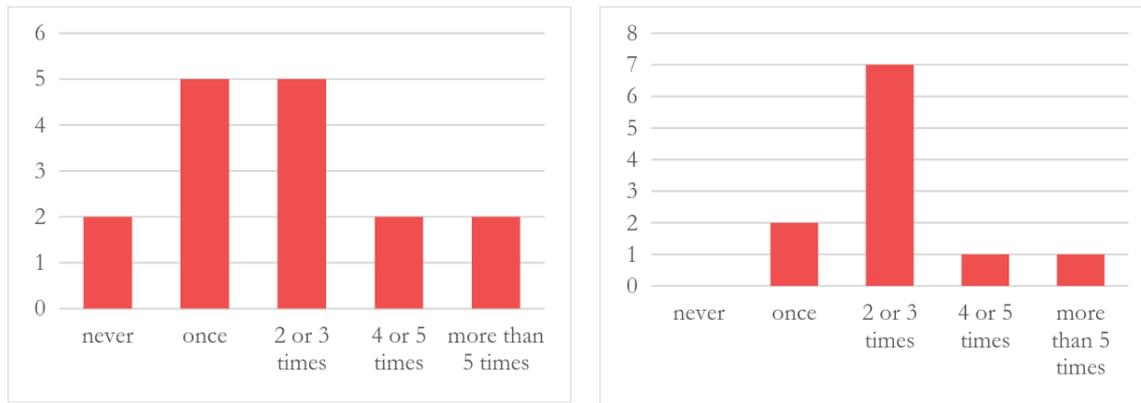
Discussion with the learner non-user group focused on determining why they did not want to use UVS (or hardly used it at all). Their answers mostly reflected an aversion to Mxit. Examples, include: 'I tried using it but don't use Mxit much anymore'; and 'Mxit is outdated' and new options have taken its place. It was also noted that Mxit has aspects they do not like, for example, needing a PIN to log in and having to ask for contacts. Other issues also did not focus on UVS, but practical difficulties resulting from living in a rural area, such as: network issues that prevent users from getting online easily; slow processing speeds; and a lack of access to electricity in their village. It was noted that the school has electricity, but a complaint noted was that, if students charge their phones at school, they are sometimes stolen off the plug.

Effects as evident in usage data

Reported usage

Intermediaries who had previously registered with the UVS were asked 'How often have you logged into the UVS platform?'

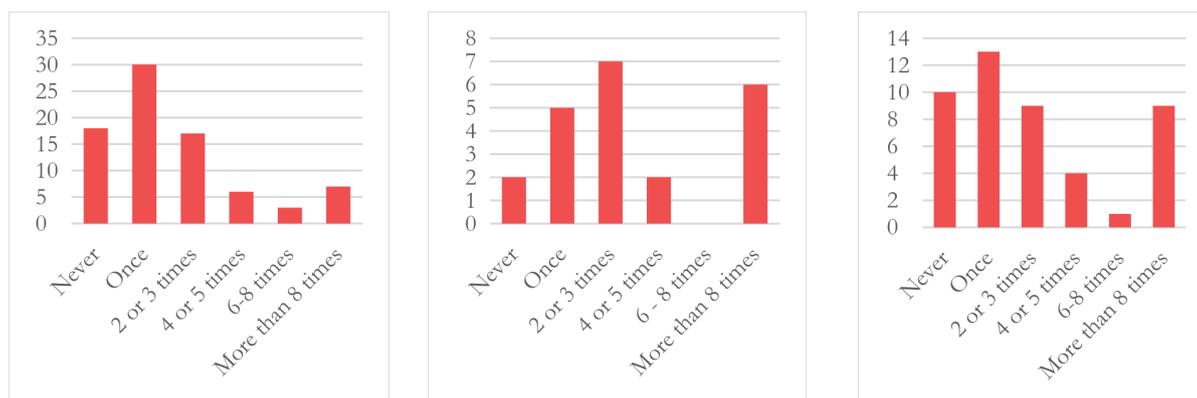
Figure 44 Number of times the TCMs have logged into the UVS (n = 16) Figure 45 Number of times the ELCs have logged into the UVS (n = 11)



For both intermediary groups, the number of times that individual officials reported logging in was typically just once, twice, or three times. The estimated mean number of log-ins was 2.5 for TCMs and 2.8 for ELCs. These numbers exclude TCMs and ELCs who had never logged in, which would obviously reduce the means substantially.

Learners, teachers, and parents were also asked how often they had logged into the service.

Figure 46 Learner reported log-in frequency (n = 81) Figure 47 Teacher reported log-in frequency (n = 22) Figure 48 Parent reported log-in frequency (n = 46)



The modal number of log-ins was once for learners, 2-3 times for teachers, and once for parents. The estimated mean number of log-ins per groups are 2.4, 4.2, and 3.3 for learners, teachers and parents respectively.

Survey respondents were next asked to identify what held them back from logging into the UVS more frequently. The answers are presented below.

Figure 49 *Hindrances to learners logging in (n = 68 but multiple responses were possible)* Figure 50 *Hindrances to teachers logging in (n = 24 but multiple responses were possible)*

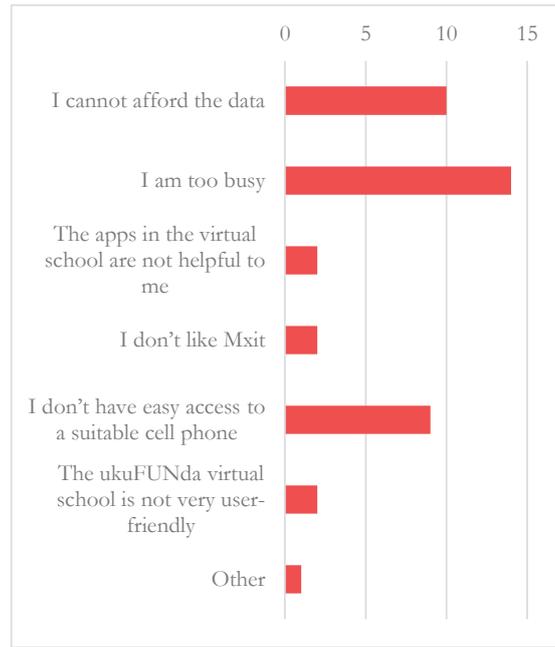
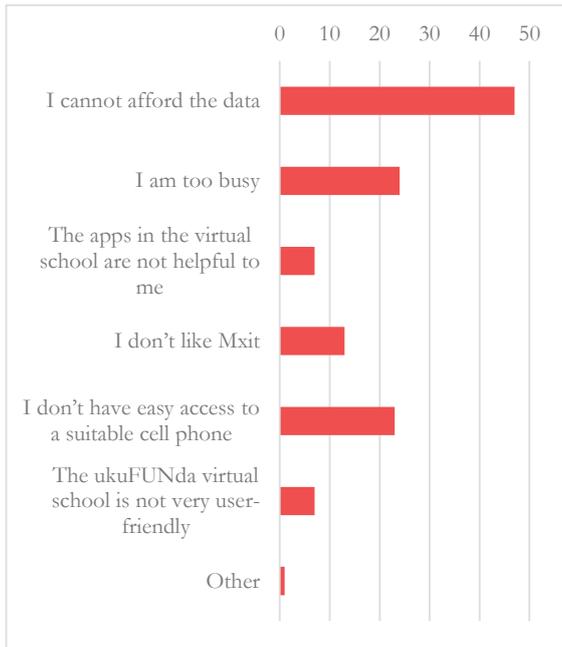
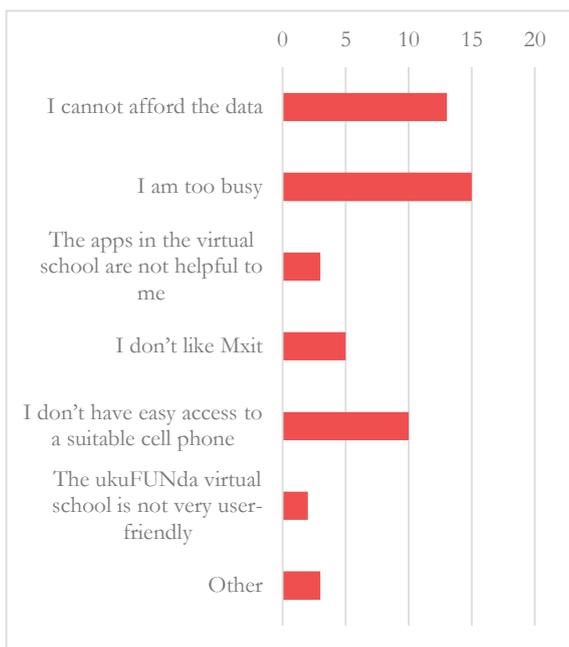


Figure 51 *Hindrances to parents logging in (n = 28 but multiple responses were possible)*



There is some variation between groups in terms of identifying limitations to logging in more frequently. For learners, financial issues were reported as paramount, with 47 indicating that they could not afford the data and 23 saying that they did not always have access to a suitable cellular phone.⁴⁰ Twenty-four learners also indicated that they were too busy. For both the teachers and parents, 'I am too busy' was the most common response (14 and 15 respectively). However, financial constraints were also relevant to these two groups, in that an inability to afford the data, or problems accessing a suitable cellular phone were second and third in the list in both cases.

⁴⁰ These were phones that are not WAP-enabled.

Actual usage

Actual usage of the service has been analysed by considering total views and posts by individual users (i.e. 'messages from' and 'messages to' the service) and then disaggregating these by the total views and posts for each application that is part of the UVS. This data covers total usage of these apps on Mxit, but many views and posts would have been generated by users accessing the apps independently of UVS. Unfortunately, it is not possible for the Reach Trust to provide data disaggregated according to whether the app was accessed via the UVS or by directly accessing the application because of the way in which Mxit is structured as a platform (Andrew Rudge, personal communication, 27 May, 2016). The PCA did not clearly separate Mxit from the UVS.

In total, 1,048,576 users at least touched the service during the period under evaluation. Since simply landing on the UVS home page and doing nothing more would result in a message count of one, those 241,085 users with a view-and-post total of one have been excluded from further analysis. Usage of the remaining 807,491 users can be viewed in terms of the following five number summary:

Table 21 *Five number summary of usage data (September 2014 to December 2015)*

	Total views/posts per user (sum of messages sent to and from service)
Minimum	2
Lower quartile	4
Median	11
Upper quartile	38
Maximum	529,950

Thus, 50% of users (n=807,491) of the UVS sent/received 11 or fewer messages and 75% sent/received 38 or fewer messages. There is a small number of users with exceptionally high usage, comprising 1,301 users (0.16% of the total) who sent/received more than 10,000 messages. These most likely comprise users who found the UVS extremely useful and/or users who used a particular application that required repeat interaction (such as playing a game of chess).

The skewness coefficient for the 807,491 users with at least two messages to/from the service is 69.4, indicating a highly positively skewed set of data. This means that most data is found towards the lower end of the distribution (i.e. most users sent/received very few messages). Given this skewed distribution, we have used a base-ten logarithmic scale to report on data indicating how many users fit into each category of usage. We have used the following terms to categorize different levels of use (using the terms skimmers, duckers, and divers proposed by Dr. Konstantin Mitgutsch (see <http://www.playfulsolutions.net/>):

- 'Skimmers' are users who skimmed across the service, interacting with it but only very minimally (between 1-10 views and posts). The 'skimmers' are in turn sub-divided into two categories: 'once-off skimmers' and 'skimmers'.
- 'Duckers' are users who engaged with parts of the service in some depth (between 11 and 100 views and posts).
- 'Divers' are users who interacted with the service repeatedly (more than 100 views and posts). This group is sub-divided further into three categories: 'novice divers', 'intermediate divers, and 'master divers'.

For this purpose, all 1,048,576 users who touched the service during the period under evaluation have been included.

Table 22 *Categories of users (September 2014 to December 2015)*

Category name	Total views and posts	Number of users	Percentage
Once-off skimmers	1	241,085	23.0%
Skimmers	2 to 10	401,480	38.3%
Duckers	11 to 100	324,613	31.0%
Novice divers	101 to 1,000	75,822	7.2%
Intermediate divers	1,001 to 10,000	4,275	0.4%
Master divers	10,001+	1,301	0.1%
	Total	1,048,576	100%

The upper bound of each category interval increases ten-fold each time to reflect the skewed distribution. This is reflective of usage patterns relating to social media and gaming applications, in which most users are skimmers, a smaller proportion is duckers, and the smallest proportion is divers. Almost two-thirds of the users (61.3%) are skimmers, who did not use the UVS service beyond some initial experimentation (ten or fewer messages over 16 months). The remaining third may be considered to be partially- to fully-engaged users, with the majority (31%) being duckers. There is also an engaged user group of 'divers' comprising almost 7.7% of users.

The table below, based partly on known data and partly on a number of assumptions applied to that known data, shows approximate percentages for each beneficiary group and for each level of knowledge or use.

Table 23 *Approximate proportions of the ukuFUNda beneficiaries in each of the knowledge/usage categories*

	Teachers	Learners	Parents
Used <i>ukuFUNda</i> regularly (active)	0.4%	0.3%	0.04%
Registered for but seldom used <i>ukuFUNda</i>	4.3%	3.0%	0.4%
Knew about <i>ukuFUNda</i> but chose not to register	21.7%	15.9%	2.3%
Did not know about <i>ukuFUNda</i>	73.6%	80.8%	97.3%
Total	156,241	4,593,497	4,593,497

This table was compiled by using the data for the target population, as defined in the methodology section.

The values in the table suggest that the parent group is using UVS proportionately least, with approximately 97.3% of parents not having ever heard about the service (subject to the limitations of our assumptions as mapped out above). A higher proportion of learners engaged with the service in at least a minimal fashion, but the beneficiary group with the highest engagement rate is teachers. For example, approximately 4.7% of high school teachers have registered on the service. Even this remains a small percentage of the total potential market of (high school) teacher beneficiaries.

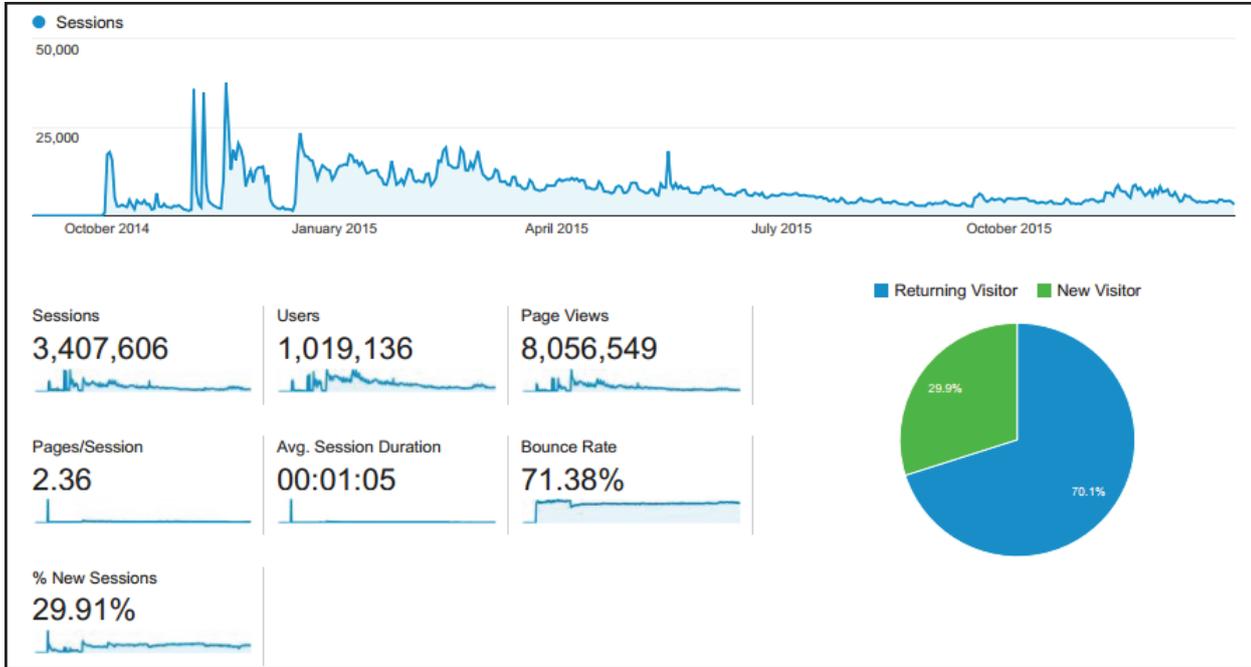
It is not possible to provide a comprehensive indication of actual usage generated by UVS. The usage data provided to us by the Reach Trust is of two types:

- 1) 'Views' and 'posts' generated as a user moved through the UVS 'door' in order to access the underlying apps (such as FunDza and Rethink Education). Because this 'moving through' is a quick process, requiring little data, it is not surprising that this data demonstrates very low usage.
- 2) 'Views' and posts' generated by usage of the underlying apps (analysed in detail below). However, usage data does not separate usage of these apps through UVS from those who accessed these apps directly. Thus, it is not possible to determine categorically the extent to which establishment of UVS as a portal contributed to any increases in use of individual apps. This is highly problematic in terms of any subsequent efforts to assess the educational impact of UVS as distinct from the education impact of individual apps that may or may not have been accessed via UVS.

Google Analytics

The Reach Trust ran Google analytics for both the learner and teacher apps. Google Analytics measures all visits to a site, not only visits by registered users. The following graphs present data collected by this tracking service for the period under review. They provide some information that is additional to that presented above, including number of sessions⁴¹ undertaken, the number of pages viewed per session, the average session duration, and 'bounce rate'.⁴²

Figure 52 Google Analytics data for ukuFUNda learner service (Sept 2014 to Dec 2015)



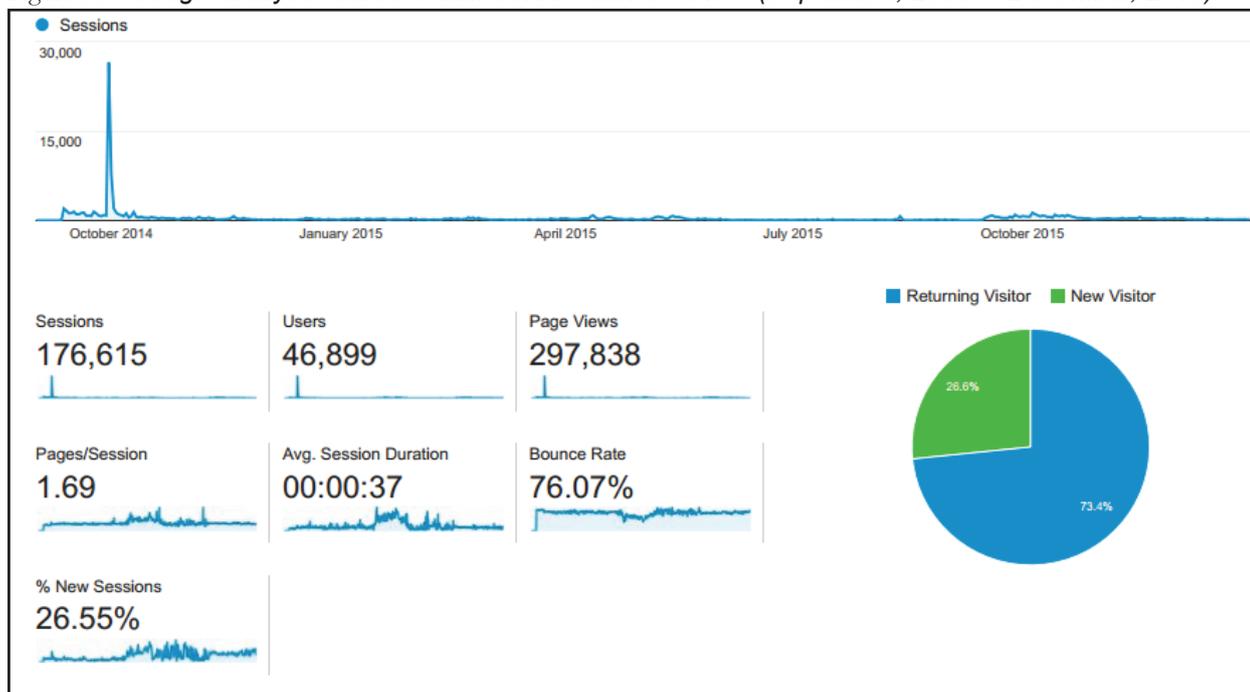
Thus, there were almost 3.5 million sessions over the 16-month period, but a bounce rate of over 70%, which means that, in over two-thirds of the sessions, the user⁴³ did not progress beyond the landing page (i.e. did not visit the UVS in any meaningful way). This is not, in itself, an unusual statistic in terms of typical bounce rates globally. It is thus not surprising that the average number of pages viewed per session is only 2.36, and the average session duration only just over one minute.

41 A session, in simple terms, is a visit to the site.

42 The 'bounce rate' is the percentage of sessions comprising single page visits (i.e. the user leaves the website from the landing page without browsing any further).

43 A 'user' as mentioned here and elsewhere in the 'Google analytics' section does not refer to an active user, but rather anyone who at any stage of the evaluation period touched or used the service. The group of active users would thus be a subset of the group of users.

Figure 53 Google analytics data for ukuFUNda teacher service (September, 2014 to December, 2015)



The data for the teachers, as shown in the figure above, shows even less deep engagement with the service than was the case with the learners. The number of pages viewed per session was 1.69, the average duration of each session only 37 seconds, and the bounce rate 76% (thus, in over three-quarters of the sessions, the visitors to the site did not move beyond the landing page).

Usage by user group

Table 23 presents messages to and from the three ukuFUNda apps: learners, teachers, and parents. This data indicates actual usage of the UVS, rather than just total usage of the apps hosted on the UVS (the latter includes usage that was independent of ukuFUNda).

Table 24 Usage of the UVS apps (September, 2014 to December, 2015)

App name	Total messages to and from the UVS	Average messages per registered user	Median messages per registered user
UkuFUNda_learner	15,060,410	98	70
UkuFUNda_teacher	548,160	65	40
UkuFUNda_parent	242,738	11	4

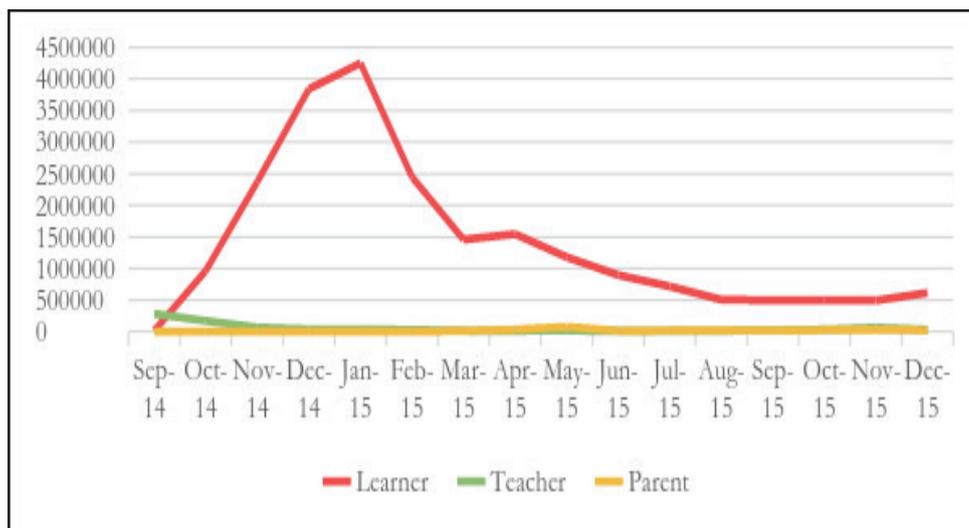
Unsurprisingly, learners were significantly the most active on UVS, comprising 95% of total views and posts on the service. This is because there were many times more learners on the service than teachers and parents. However, learners were also individually much more active than teachers and parents, with a mean of 98 views/posts per registered learner compared with 65 and 11 for teachers and parents respectively.

Mean values can easily be skewed by a few super-users, so a more useful indicator of 'average' is to use the median. In all groups, the median is below that of the mean, indicating that usage data for all groups is positively skewed. The median values indicate that half of all registered learners sent/ received fewer than 70 messages, with the corresponding values for teachers and parents being 40 and 4 respectively.

On the UVS, the mean number of posts by registered learners was 40.2 and mean views were 58.0, giving a mean number of 'views and posts' was 98.2 over 16 months. The mean number of 'views and posts' per month was therefore 6.1.

The graphs below show the usage for each user group over time, as measured by total numbers of views and posts by registered users.

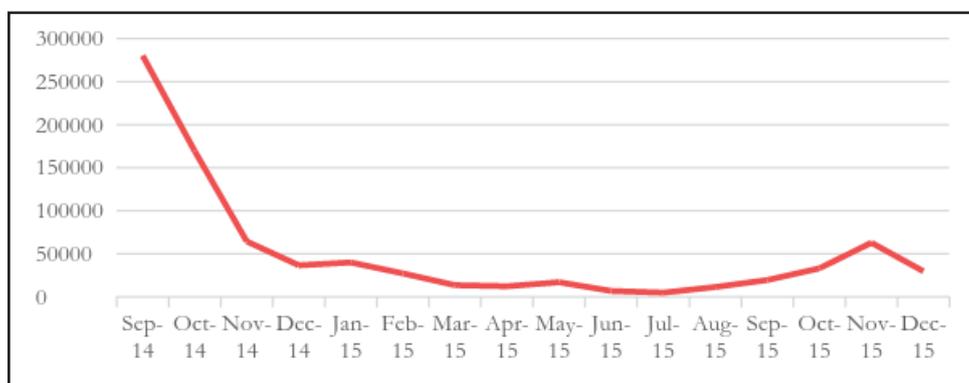
Figure 54 Usage for each user group over time (registered users only)



For learners, usage increased rapidly over the first few months to a peak usage of 4,251,830 views/ posts in January, 2015. This corresponds with the initial spread of and enthusiasm for the service. Thereafter, there was a rapid and steady decline, with each month having fewer views/posts except for April, 2015 and December, 2015, which reflected slight increases over the figures of the previous month.

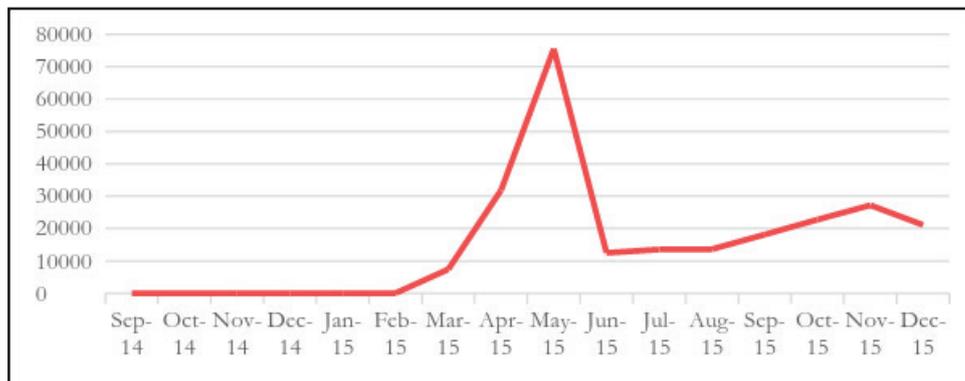
Since the totals for the registered teachers and parents do not show up well on Figure 49, they are shown separately below.

Figure 55 Usage for teacher user group over time



The teacher user group has a very different usage profile over time, when compared with learners. For teachers, peak usage was in the first month (September 2014, with 280,270 views/posts), with a steep decline thereafter to the lowest usage in June/July 2015. Thereafter, there was some recovery in usage, with the November 2015 usage being over 13 times more than in July of that year. It is not known what might have caused the late 2015 minor surge, but it may have been a function of the service being used to obtain resources for the end-of-year examinations.

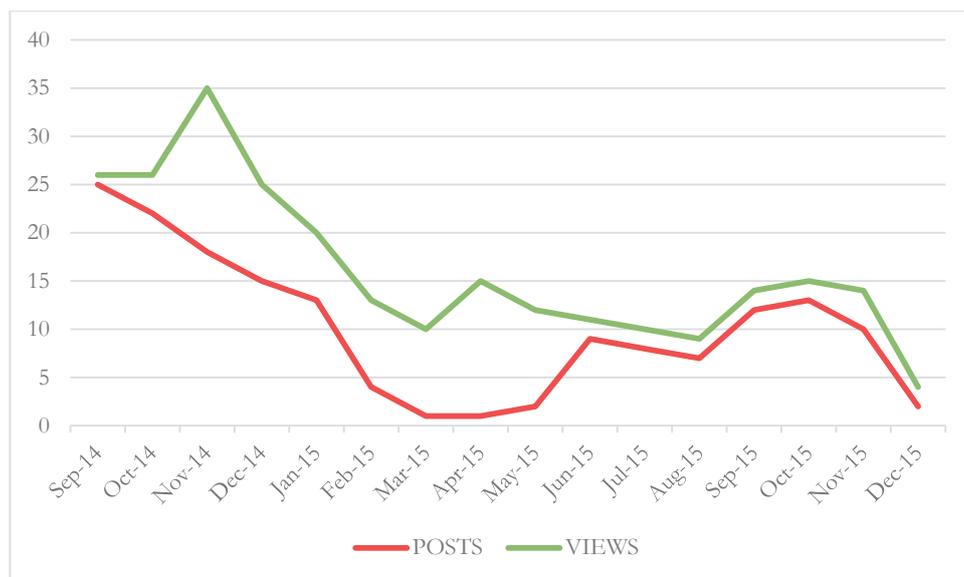
Figure 56 *Usage for parent user group over time*



The parent user group shows no usage until March 2015, when the app was first launched. Thereafter, there was short-lived, rapid growth in usage to a peak of 75,566 views/posts in May 2015, followed by a dramatic collapse. As for the teacher group, however, there was some recovery in usage in the last few months of the year.

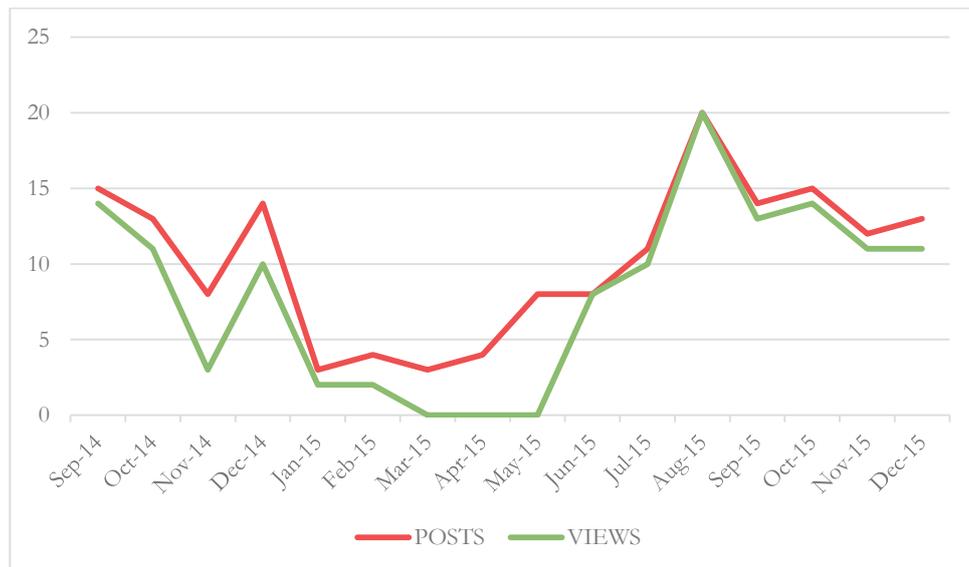
In addition, data for individual users was analysed, month-by-month, so as to provide an indication of median usage. 'Median usage' was chosen as preferable to 'mean usage' since it is not affected by a few extreme values (outliers). The findings are shown in the figures below (one for each of the user groups).

Figure 57 *Median usage of individual learners, by month*



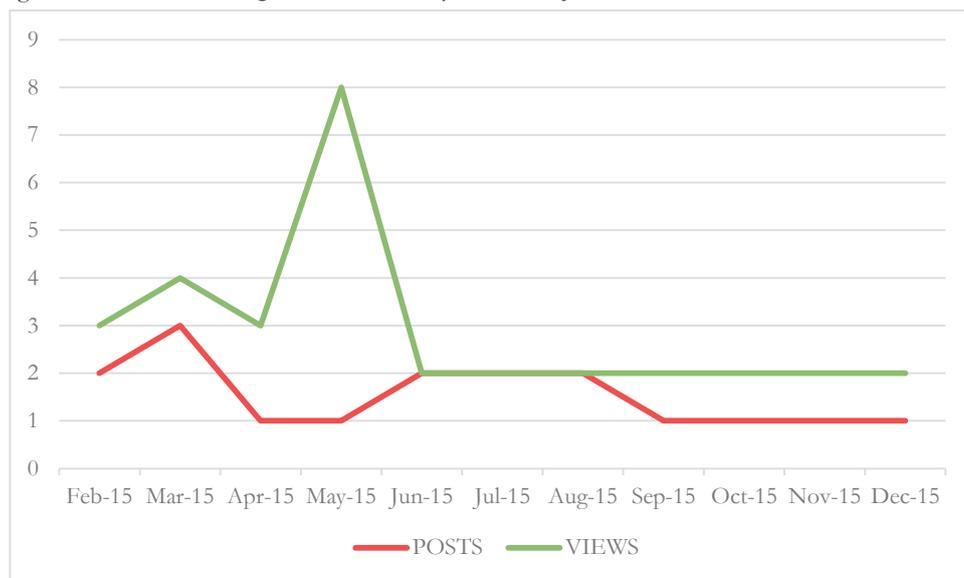
For learners, median usage hit its highest points (20-25 posts and 25-35 views per month) in the first few months and then declined rapidly to a median usage of around 9 posts and 12 views in the second half of 2015. December, 2015 usage was very low, which was to be expected as learners were on holiday.

Figure 58 Median usage of individual teachers, by month



Teachers’ median usage varies quite dramatically, but the overall trend – for both posts and views – is a start at around 15 views and 15 posts, a big decline to negligible use in the first half of 2015, and then growth in usage back to and above levels seen at the start.

Figure 59 Median usage of individual parents, by month



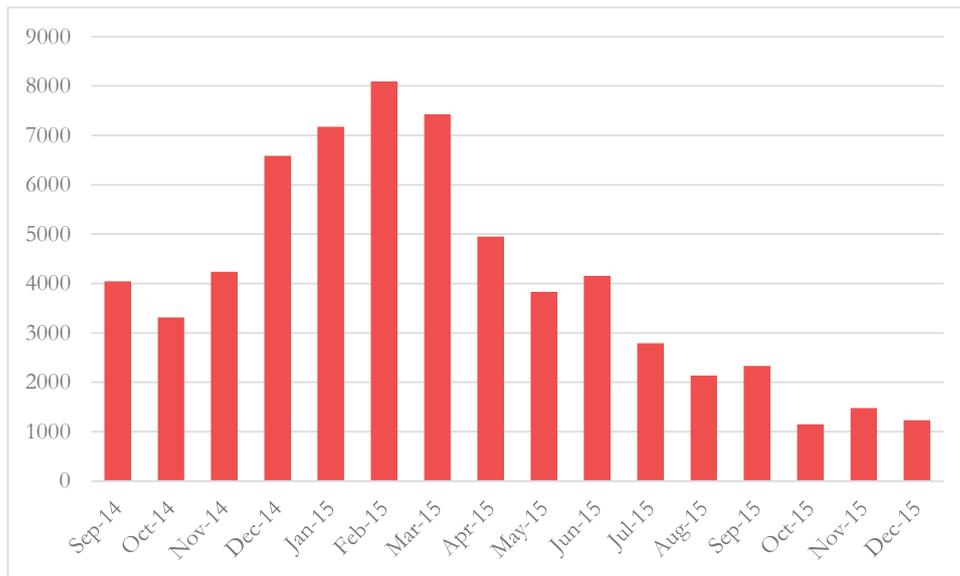
The most notable point about the parents’ median usage is not any fluctuation that may be observed, but the very low values. Apart from one month, posts and views were consistently at or below four each month.

Overall, median usage across all groups is rather low. The highest median usage for most of the evaluation period was that of the learners.

Usage by ‘super users’

To assess whether there was any sustained use of UVS over the evaluation period, the number of ‘super users’ was determined for each month, collated across all user groups. A ‘super user’ is an individual who accessed the service on 12 or more occasions in the month. The results are shown in the figure below.

Figure 60 *Numbers of super users, by month*



The graph shows that, similar to general usage of UVS over the period, the number of super users started around at a moderate level (4,045 in September, 2014), increased in early 2015, reaching a peak of 8,095 in February 2015, and then decreased to relatively small numbers (with just over 1,000 super users in each of the last three months of 2015).

App usage

Table 24 presents usage of the various apps on the UVS platform for September, 2014 to December, 2015, arranged in descending order of the total number of messages sent to or from the app. As has been indicated, app usage is Mxit-wide, so it is unclear what proportion of these views and posts were generated by users accessing the app through the UVS portal. This data has nevertheless been included to give an indication of the extent of use of the different applications (which was part of the theory of change for expected improvement in learner outcomes). However, without disaggregated data on the apps, it will not ever be possible to determine what educational effect the UVS specifically had, compared to the effect of the apps without the UVS.

In the table, apps with an asterisk after their name – 10 out of the 30 apps - indicate apps that are no longer available on the platform. Apps are colour-coded by quartile to facilitate interpretation.

Table 25 Views/posts on apps available on the UVS (September, 2014 to December, 2015)

	APP	Unique users	Messages to app	Messages from app	Total messages to/from app	Quartile
1	Chess*	5,165	68,722,044	76,825,072	145,547,116	Max
2	FunDza	33,877	7,590,820	14,748,899	22,339,719	
3	UkuFUNda_learner	165,700	8,376,009	13,911,715	22,287,724	
4	Mychoma	19,093	4,996,987	5,370,611	10,367,598	
5	Brainwc (now called CareerXplora)	27,939	2,066,683	4,428,147	6,494,830	
6	Oxford Word of the Day*	10,271	500,224	3,936,398	4,436,622	
7	Rethink Education	16,572	887,803	2,941,102	3,828,905	
8	MGirls	10,595	442,780	2,977,904	3,420,684	Upper quartile
9	MobieG	7,813	1,011,973	1,328,391	2,340,364	Upper quartile
10	Nal'iBali	18,989	n/a	n/a	2,200,300	
11	QuizMax	12,961	722,047	740,342	1,462,389	
12	Springbooks*	3,410	551,799	753,449	1,305,248	
13	Everything Science	5,488	431,427	431,777	863,204	
14	UkuFUNda_teacher	17,536	360,002	466,988	826,990	
15	Childline	8,769	359,589	460,196	819,785	
16	Everything Maths	6,769	399,582	404,773	804,355	Median
17	Learn Xtra	18,517	358,075	398,074	756,149	Median
18	LoveLife	9,608	143,964	593,286	737,250	
19	TCC_app	11,369	105,564	301,247	406,811	
20	Mobi School*	11,959	174,765	146,827	321,592	
21	Magic Tables	8,739	118,971	126,552	245,523	
22	UkuFUNda_parent	22,496	92,709	150,959	243,668	
23	Periodic Table	8,578	111,572	124,816	236,388	
24	Angel*	2,344	44,934	55,269	100,203	Lower quartile
25	Reach Maths*	7,141	588,79	64,758	64,758	Lower quartile
26	Google Safety	1,674	19,850	22,731	42,581	
27	Rape Crisis	1,467	19,052	21,739	40,791	
28	Sf.sudoku*	83	8,515	11,954	20,469	
29	Mac911	537	4,245	3,003	7,248	
30	Yesa_quest*	145	3,209	3,140	6,349	
31	M-books*	56	1,941	1,284	3,225	
32	Study and Exams*	288	1,181	1,359	2,540	

The data in the above table illustrates that most of the apps with high message counts were educational: six of the nine educational apps appear in the top ten apps by message count. Conversely, most of the least-used apps were safety and wellness apps. This view is supported by the average total number of messages per type of app. For the ten educational apps, the mean is 3,923,176 (with a standard deviation of 6,411,323), whereas, for the nine safety and wellness apps, it is 2,020,346 (with a standard deviation of 3,150,201).

Usage by number of views and posts, as analysed above, is one way in which one can measure the relative usage of different apps. However, this has its shortcomings, in that, for example, some apps would be more likely to generate multiple views and posts in a short space of time (for example, chess, where each move is a message), whereas others could be used extensively without generating several messages (for example, FunDza, which is downloaded as chapters not individual pages and thus reading the entire book might generate only ten views and posts) (Andrew Rudge, personal communication, 26 July 2016).

An alternative measure of usage of an app is by the number of users of that app. This is also somewhat problematic, in that it does not give an indication of the *amount* of usage by each user, but is nonetheless a useful further indicator to complement the ‘number of messages’ per app. Table 25 shows the number of users for the ten apps with the highest number of users.

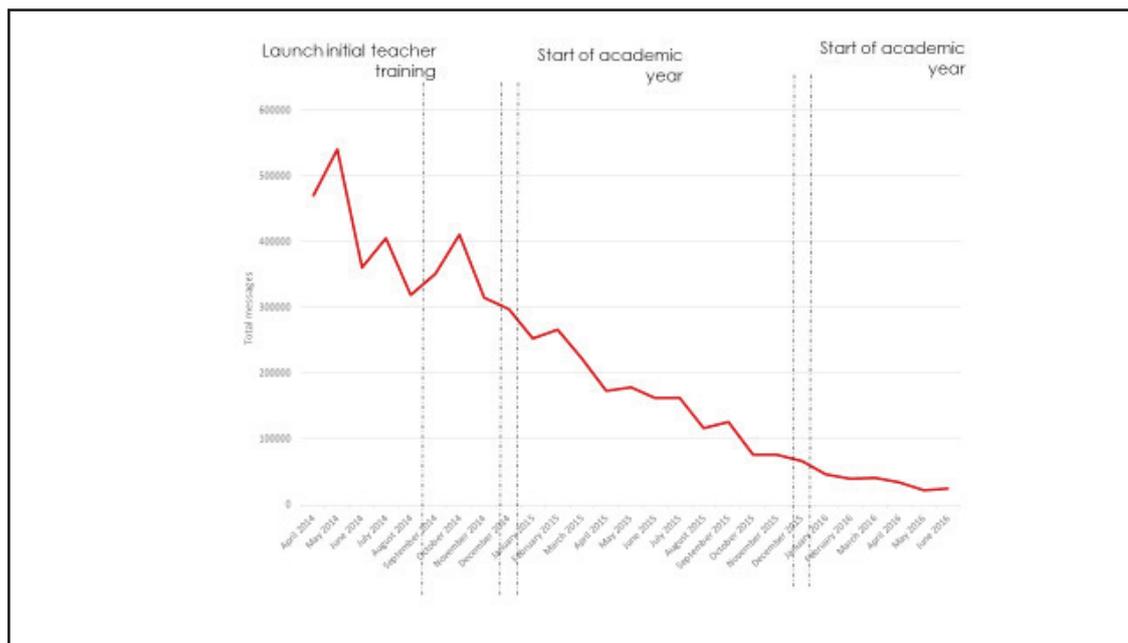
Table 26 *Number of unique users per app (top 10 only)*

App name	Type of app	Number of users
<i>uknFUNda_learner</i>	n/a	165,700
FunDza	Educational	33,877
Brainwc / CareerXplora	Educational	27,939
<i>ukuFUNda_parent</i>	n/a	22,496
MyChoma	Safety & wellness	19,093
Nal'ibali	Educational	18,989
LearnXtra	Educational	18,517
<i>uknFUNda_teacher</i>	n/a	17,536
Rethink Education	Educational	16,572
QuizMax	Educational	12,961

This table confirms that the apps with the most usage were generally educational apps. However, this should not be taken to imply that the safety and wellness apps had no value; for those who used them, they may have been of enormous benefit. This is referred to by the Reach Trust CEO as ‘existence value’.

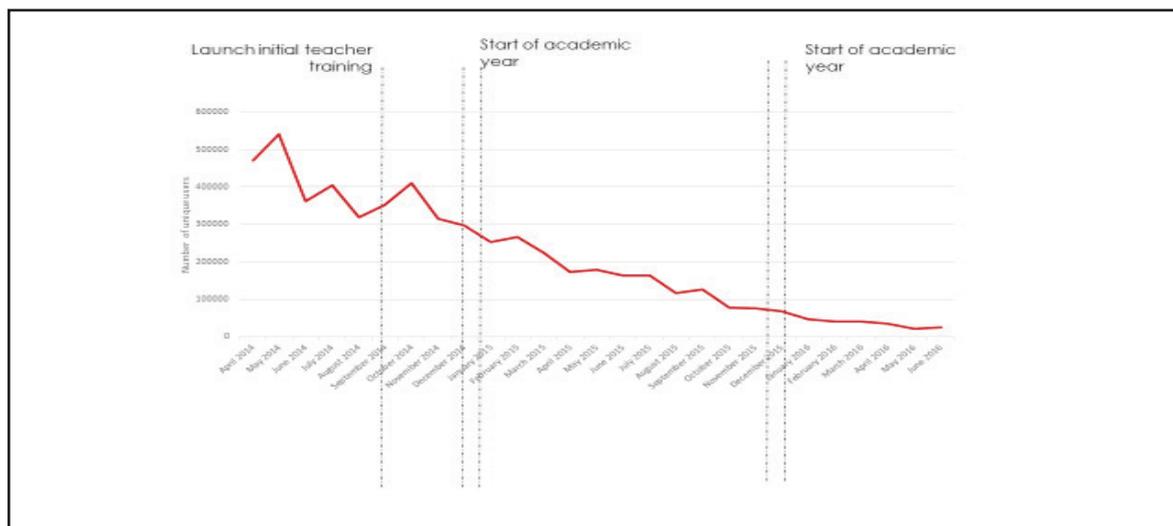
One way to consider the impact of UVS is to compare use of the underlying applications (which UVS aggregated into a portal) before and after the launch of UVS. One cannot be certain that uptake and usage of these applications was a result of UVS, as users could also access the applications directly via Mxit and it is not known what other activities were underway in parallel that might have influenced use. However, it was hoped that UVS would increase uptake and usage to these applications, so one might anticipate increased use following the launch. The following figure presents the total number of messages to and from third-party applications per month:

Figure 61 *Number of messages on underlying third-party applications (April 2014 to June 2016)*



While there was an increase in message activity immediately after the UVS launch in September 2014, this spike was short-lived and there was a general decline in message activity on third-party applications over the evaluation period. A similar pattern is evident for users of the third-party applications, as shown below:

Figure 62 Number of users⁴⁴ on underlying third-party applications (April 2014 to June 2016)



While there was a small increase in unique users on the underlying third-party applications immediately after the UVS launch in September 2014 there was a steady decline over time overall, in line with the general decline of usage in Mxit overall. These graphs indicate that there is no meaningful evidence that the aggregation of apps via the UVS had any significant long-term effect on use of the apps.

Those intermediaries and beneficiaries who logged in four or more times to UVS were asked to list up to three apps on the service that were ‘the most useful’ to them. The app that intermediaries felt was most useful (with four out of five respondents choosing it) was MindSet Learn Xtra. Other apps chosen by more than one respondent were QuizMax and Rethink Education. Academic support apps were chosen far more often than psycho-social support apps, comprising 12 of the 14 ‘votes’.

For learners (n=21), the most useful app was CareerXplora (nine responses), followed by LoveLife (six responses) and FunDza (five responses). For teachers (n=6), the most useful app was FunDza (three responses) followed by the Periodic Table and the School Self-Evaluation Instrument (two responses each). Finally, for parents (n=15), FunDza was top (six responses), followed by MindSet Learn Xtra (five responses), and three apps each with four responses (CareerXplora, ChildLine, and Nal’iBali).

Apps that across the board received very few votes (criterion: a total of 2 or fewer total votes) are the following: Family Safety Centre; Mac911; Magic Tables; and TCC.

Relevance

Relevance refers to the ‘extent to which the objectives of a development intervention are consistent with beneficiaries’ requirements, country needs, global priorities, and partners’ and donors’ policies’.⁴⁵ To explore this, we focus on responses to questions in interviews and surveys about the relevance of the UVS to the various stakeholder groups.

Project partners were asked whether they thought the UVS adds value to the work of the DBE. Most responses referred to potential of the service in terms of its ability to reach teachers and learners. The respondents were asked what the UVS offered that other DBE ‘solutions’ do not? Responses are presented below.

⁴⁴ The data informing this graph is calculated by adding the users for each of the apps on UVS so as to get a total. This is highly likely to mean that some users were double-counted, meaning that this graph does not show unique users. This aggregate graph is very similar to the ‘number of user’ graphs for most of the individual underlying apps.

⁴⁵ OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p36, <http://www.oecd.org/dac/evaluation/2754804.pdf>

- *The technology can reach a lot of teachers quickly and cheaply. This is not as expensive as bringing them (teachers) altogether for training*
- *High accessibility – almost every learner has a suitable mobile phone to access it, but others that are browser-based (need smart phones) are harder to access for many learners*
- *Access to resources on feature phones. This service has a bigger pool of registered users.*
- *Potential for greater reach than most – easy to access, due to high penetration of feature cell phones*
- *Many others best experience is on a PC or laptop, not cell phone.*
- *Good solution for rural and isolated schools*
- *Interactive: e.g. learners can interact with teachers – questions are answered*
- *Involvement of parents: can see what their children should be learning day-to-day*
- *This service offers immediacy. This is our first experimentation in mobile learning and it is helping to bring the concept of BYOD to life. It has not been a scripted project, but rather exploratory.*

They were also asked to rate their responses to statements about relevance.

Table 27 *Summary of responses of project partners to questions on relevance (n=9)*

Relevance (project partners, n=9)	1	2	3	4	5
(1=strongly disagree, 2=disagree; 3= neutral; 4=agree; 5=strongly agree)					
The UVS has completely met the agreed project vision in terms of the DBE's education goals for e-learning (which encompasses m-learning)		1	6	1	
The UVS has completely met the agreed project vision in terms of UNICEF's priority of using innovation to improve learning outcomes;		1	5	3	
The UVS has completely met the agreed project vision in terms of the United Nations' MDGs	1	1	4	2	

The above responses indicate that project partners were overwhelmingly neutral about the relevance of the UVS to DBE e-learning goals, UNICEF's innovation priority; and the United Nation's MSGs.

The following responses indicated areas in which individual project partners noted disappointment with what was delivered:

- *The UVS was never a good fit for the DBE goals for e-learning (it was retro-fitted)*
- *This intervention had potential in theory, but in practice has been a disappointment. It has over-promised and under-delivered. It may be important to share the learnings from this experience with the wider m-learning community.*
- *It has innovation potential – but when does usage match innovation?*
- *It is not improving quality*
- *Is should focus more on psycho-social*
- *No tracking of learners*
- *not marketed as it should.*

App/content service providers also rated their responses to relevance statements:

Table 28 Summary of responses of app/content service providers to questions on relevance (n=7)

Relevance (app/content service providers, n=7) (1=strongly disagree, 2=disagree; 3= neutral; 4=agree; 5=strongly agree)	1	2	3	4	5
I believe the UVS is completely relevant to high school learners		1	2	4	
I believe the UVS is completely relevant to high school teachers		2	3	2	
I believe the UVS is completely relevant to parents		2	3	3	

These responses indicate few strong feelings in either direction, with no responses in the ‘strongly disagree’ or ‘strongly agree’ bands. Responses are, on average, slightly skewed towards positive responses, but there are some service providers who responded neutrally (‘neutral’) or slightly negatively (‘disagree’).

When asked how the UVS could be improved to make it more relevant to its targeted users, individual app/content service providers gave various responses, ranging from creating a stand-alone app (for example, ‘make *ukuFUNda* a stand-alone app, so that more users will be able to find this app on social networks’), to moving it off the Mxit platform (for example, ‘for the UVS to be relevant for students, teachers and parents, it will need to be available on smartphones and not reliant on the Mxit platform’).

Feedback on relevance for the three beneficiary groups was via a response to two Likert-scale questions, summarised separately for learners and teachers below. Amongst parents, there were not sufficient responses to analyse the Likert-scale questions on relevance.

Figure 63 Learner responses to relevance questions (n=16)

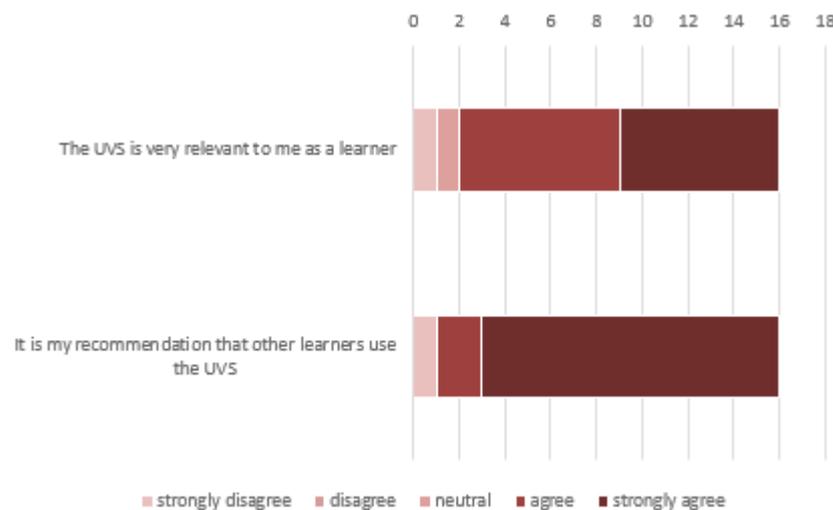
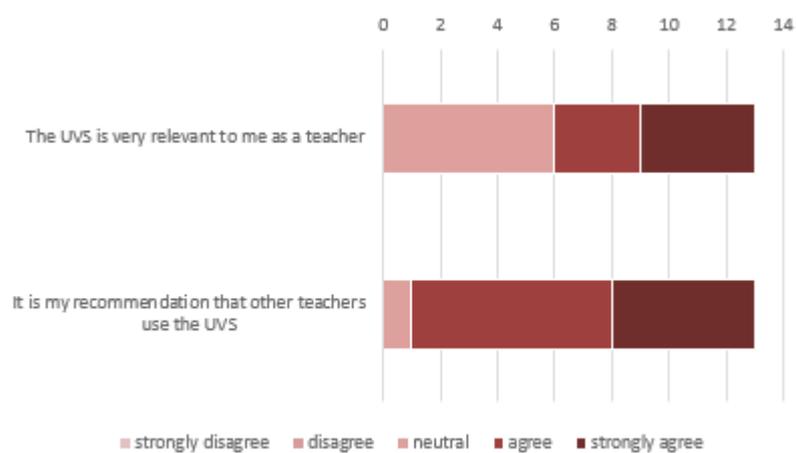


Figure 64 *Teacher responses to relevance questions (n=13)*



Learners were, on the whole, quite positive about the relevance of the UVS, with all but two (12.5%) responses being 'agree' or 'strongly agree'. Teachers were not quite as positive about the service, particularly in responding to the statement 'The UVS is very relevant to me as a teacher', where nearly half of the respondents responded as 'neutral'. Both groups strongly recommended the use of the service to their peers.

Efficiency and cost-effectiveness

Analysis of costs associated with the development of UVS

Costs projected in the PCA budget

The total budgeted amount for the UVS in the PCA (March 2013) was R12,049,000. This is the budget against which the Reach Trust made claims to UNICEF. It included specific line items, such as hosting the service and developing the dashboard, and direct programme support costs (staff and office costs). The budget was split 40%:60%, with UNICEF covering R4,836,600 of the proposed budget and Mxit contributing R7,212,400.

Revenue generation from the UVS was not factored into the PCA. The Reach Trust CEO explained that this was because revenue agreements were made between Mxit and the third party content providers who developed their applications for inclusion on UVS. In these relationships, no revenue was directed to any of the UVS partners (UNICEF, DBE, or the Reach Trust). A revenue sharing agreement, based on advertising income, was agreed with Mxit receiving 30% of income and content providers 70%. Because of the declining Mxit user base and Mxit no longer being financially viable, the Reach Trust reported that no advertising revenue was sought and income from such revenue was 'next to none' (Andrew Rudge, personal communication, 7 July 2016).

The budget breakdown presented below indicates how the budget was constructed:

Table 29 *Original UVS budget (PCA, March 2013)*

	Unit	Unit Cost	Number	Total budget	Mxit portion	UNICEF portion
Programme Costs						
Development of UNICEF Portal and ongoing hosting for each learner @R7 per learner per year	per learner	250,000	14	3,500,000	1,050,000	2,450,000
Workshop to finalise design of UNICEF Virtual School	Workshop	1	25,000	25,000	8,000	17,000
Development Team for development of Virtual School	Infrastructure Development (months)	3	288,000	864,000	200,000	664,000
User Experience and User Interface designers for Virtual School	Infrastructure Development (weeks)	2	48,000	96,000	48,000	48,000
Cloud hosting and operational support	per month	20	17,000	340,000	152,000	188,000
Testing and deployment of Virtual School Programme	per month	1	20,000	20,000	20,000	-
Monitoring and support of Virtual School Programme	per month	20	10,000	200,000	100,000	100,000
Development of interactive dashboard and integration of data sources	Infrastructure Development (months)	2	375,000	750,000	250,000	500,000
Monitoring and technical support for dashboard	per month	20	5,000	100,000	50,000	50,000
Promotion of UNICEF portal to existing Mxit users, using Mxit advertising	per subscriber	18,000,000	0.18	3,240,000	3,240,000	-
Pondering Panda Surveys (assuming avg. survey 6 questions)	per survey	4	96,000	384,000	134,400	249,600
Quarterly Reports including presentation to UNICEF and other partners	per report	4	7,500	30,000	10,000	20,000
		<i>SubTotal</i>		<i>9,549,000</i>	<i>5,262,400</i>	<i>4,286,600</i>
Direct Programme Support Costs						
Office Rent	per month	20	17,000	340,000	170,000	170,000
Project Manager	per month	20	70,000	1,400,000	1,400,000	-
Project Assistant	per month	20	36,000	720,000	360,000	360,000
Telecommunications	per month	20	2,000	40,000	20,000	20,000
		<i>SubTotal</i>		<i>2,500,000</i>	<i>1,950,000</i>	<i>550,000</i>
		Grand Total		12,049,000	7,212,400	4,836,600

There are some errors in the above budget. These include:

- Mxit charging for hosting for 2 years when it should have been for 21 months (1.75 years)
- UNICEF was meant to share the cost of the project manager 50:50 with Mxit, but the budget shows no UNICEF contribution

- A number of the line items were charged over 20 months rather than 21 months

These errors were noticed approximately six months into the contract, and Reach noted them to UNICEF. However, it was decided that a change to the PCA (which would have been a very bureaucratic process) was not warranted [Andrew Rudge, personal communication, 20 July 2016]. The UNICEF contribution was more than the PCA budget, but by less than the 20% threshold over which a formal amendment to the PCA would have been required.

Neither Mxit nor the Reach Trust received any payment to run the UVS from April to September, 2015, but nevertheless continued to run the service. Since October, 2015, funding has been provided by the FirstRand Empowerment Fund as part of Reach's acquisition of Mxit [Andrew Rudge, personal communication, 12 July 2016].

The budget includes both a budget line item for the 'development of the UNICEF Portal and ongoing hosting for each learner @ R7 per learner per year' and a monthly fee for 'cloud hosting and operational support'. The Reach Trust CEO explained the rationale for this as follows:

When Reach approached the Mxit Executive Directors in November 2012 requesting that they support the ukuFUNda Virtual School, there was an initial reluctance. The primary reason for this was that the ukuFUNda target market (high school learners) was not Mxit's focus area. While 13-17 year olds accounted for approximately 25% of the overall Mxit audience at the time they generated less than 5% of revenue. This group was responsible for 25% of the costs, but generating very little revenue. In other words it was costing money to host the younger audience as the costs of supplying the service was greater than the revenue being generated from this audience...Mxit Revenue was generated primarily through advertising. Most companies were targeting young adults rather than teenagers, in fact the most lucrative advertising audience was the 25 – 34 year old category, which tended to have the highest disposable income and was therefore the most attractive audience for advertisers. There were very few companies that wanted to target the Mxit teenage audience.

The second revenue channel was through a digital currency called Moola. Users would convert airtime into Moola and this was spent on a range of items on Mxit, including games, chat rooms, music, wall papers and emoticon packs. In order to buy Moola, one needed airtime, and generally the teenage segment of the Mxit audience had less airtime at their disposal. The most active spenders on Mxit were 18 to 24 year olds, followed by 25 to 34 year olds. When the new shareholders acquired Mxit in October 2011, the Mxit Executive had been tasked with growing revenues, and they were specifically focusing on growing the young adult category, not the teenage base.

From a cost perspective, these included the usual company operating expenses (staff, rent, computer equipment etc) and then the cost of connectivity and hosting. Connectivity requirements were significant given that Mxit was processing between 500 million and 1 billion messages per day! (By way of comparison Vodacom was processing around 50 million SMSes per day, including all their PleaseCallMe traffic.)

The other major cost was user hosting. Part of Mxit's appeal was that it stored all data (messages, pictures, videos, etc) on behalf of the user. The reason for this was that most feature phones had very little memory and storage capacity on the device itself, so the ability to store extra information in a personal folder that was not on the device was very attractive to users. This also helped with multiple users on one device, which was particularly common amongst low income households where people tended to share the same phone. Using Mxit, each user would have their own login details and have a separate and secure personal folder...

While the hosting for users was a significant advantage for the user this introduced additional costs for Mxit as all this information was being stored on the Mxit infrastructure. There was a fixed and variable component to the costs, with economies of scale meaning that the average cost per user decreased as the numbers of users increased. But as a company Mxit needed to ensure that the revenues generated from users, exceeded these costs. At the time Mxit was adding around new 50,000 users per day and the focus was on ensuring that these were the "right" type of income generating users. Mxit directors were therefore focusing on the most profitable users, not learners.

At the same time Mxit acknowledged that they had important role to play in the education space and that learners at the time may become profitable customers in the medium term. Reach therefore proposed that a portion of the funding for Ukufunda be structured on a hosting charge basis, in order to ensure that the key hard costs were covered and did not place Mxit under undue operating risk. The approach adopted was to calculate the average cost of a Mxit user and then use that as a baseline to determine what a hosting charge should be.

A calculation was undertaken using the Mxit's core operating costs (core infrastructure, related computers and servers, operational staff), divided by the average number of users at the time (± 10 million). This revealed a base average user cost of $\pm R7$ per year. Mxit then suggested a 30% discount cost be applied, as they were wary of being seen to profit from the Ukufunda project in anyway. So the suggested hosting charge based on an anticipated 250,000 users was R7 of which UNICEF was contributing R4,90 per user, which totalled R2.45 million for the original project period. Mxit also offered to further discount the hosting charge should the number of users increase. And Mxit committed to more than match this hosting charge in the form of advertising inventory to the minimum value of R3.24 million.

At a technical level Mxit isolated servers at its primary hosting facility with Internet Solutions as well as the secondary (back up) facility. These were exclusively set aside for the Ukufunda user base. (Mxit actually set more servers aside in case there was a sudden surge in demand). The server infrastructure was set up at inception of the project as Reach anticipated launching Ukufunda within 3 to 6 months. The hosting charge included the costs of setting-up the servers and the ongoing maintenance, upgrading of operating software etc.

It is important to note that the average Mxit user cost increased considerably between 2013 and 2015 (the number of active users declined, but the fixed cost portion could not be adjusted as quickly, especially those related to the contract with Internet Solutions). During the review period (Sep 14 to Dec 15) the average cost per user on Mxit increased to around R24 per user per year. This increased cost was borne by Mxit. And Mxit covered all of the Ukufunda costs from March 2015 to September 2015. After September 2015, the funding has been provided by the FirstRand Empowerment Fund as part of Reach's acquisition of Mxit.

Another aspect to note is that Mxit is obliged to record and store all data for at least 5 years to meet its obligations to protect users and meet SAPS requests for data should any criminal activity be identified and investigated. Thus even when users are no longer active on the platform Mxit continues to incur costs storing the data.

I asked the former Mxit CFO to calculate the actual cost of hosting the Ukufunda users (learners, parents and teachers) on the Mxit infrastructure for the period from inception April 2013 to December 2015. The cost was R11.2 million.

(Andrew Rudge, personal communication 'Clarification on Mxit Hosting charges' 12 July 2016)

Analysis of documented expenses

During the UVS project intervention, there were three additional advances made by UNICEF to Mxit/Reach in addition to the original budget:

- 1) R62,331 as a reimbursement of additional expenses which were mostly travel related;
- 2) R443,000 to cover the costs of hosting the UVS launch, including transporting participants to the venue; and
- 3) R442,000, which was an additional tranche for the period January 2015-March 2015, for ongoing costs of the service (such as hosting and programme support costs).

The final tranche provided indicative monthly costs for the Reach Trust's hosting and programme support which amounted to R147,000 per month. In total, the direct UNICEF contribution over the life of the project was R5,783,931.

Table 30 *Investments made by UNICEF for UVS*

	UNICEF
Original budget (for 21 months)	R 4,836,600
Re-imburement for expenses	R 62,331
UVS launch costs	R 443,000
Additional tranche Jan15-Mar15	R 442,000
<i>Total</i>	<i>R 5,783,931</i>

The UNICEF Programme budget officer requested the Reach Trust to provide a breakdown of actual costs for each reporting period as per its accounting system. The combined General Ledger extract that the Reach Trust provided to UNICEF (for the life of the project) reflected total expenditure of R10,238,480.11 on the UVS for the period April 2013 to March 2015.

Table 31 *Reach Trust general ledger extract for UVS work*

	UNICEF	Reach Trust	Total
Original budget for 20 months)	R 4,836,600	R 4,454,549	R 9,291,149
Re-imburement for expenses	R 62,331		R 62,331
UVS launch costs	R 443,000		R 443,000
Additional tranche Jan15-Mar15	R 442,000		R 442,000
<i>Total</i>	<i>R 5,783,931</i>	<i>R 4,454,549</i>	<i>R 10,238,480</i>

As total expenditure was greater than the budgeted amount, the UNICEF programme budget officer indicated that the Reach Trust 'capped' its reported expenditure to UNICEF as per the agreed budget. Consequently, it is not possible to comment on actual expenditure on the line items in the budget, as the only financial data supplied (apart from travel expenses) is an indication of expenditure against the budget, where the amounts presented re-state the budgeted amounts rather than actual expenses. However, it can be concluded that the project was more expensive to run than anticipated.

Neither the actual Mxit/Reach Trust expenses nor the in-kind cost contributions of other project partners were tracked systematically against the budget line items in order to verify actual expenditure. Additional in-kind costs to run the UVS service over the period of the intervention include, for example, time given by partner members to attend regular meetings and deal with correspondence around the service, as well as the two teacher training sessions held with education officials. These would have incurred substantial additional expenditure over and above the approximately R10 million reported above. However, given the above limitations to the data, no actual expenses of the project are included in this report.

Notwithstanding the above, some observations about costs are possible, though these are by nature tentative given the data limitations. A key assumption on which UVS budgets were based was that the very high initial user base of Mxit would transfer into high numbers of users for the UVS. On this basis, hosting budgets for the project were driven by assumptions of estimated numbers of users of UVS. According to the Reach Trust CEO, these hosting costs reflected a broader agreement made by Mxit with its Internet Service Provider (Internet Solutions) to 'lock in' agreed prices for hosting and data, in order to protect Mxit against future inflationary costs. However, locking in these prices proved problematic for Mxit as its business model ran into problems and its user numbers declined precipitously as a result. Unfortunately, though, some of these 'locked in' hosting prices had to be passed onto the UVS, with the result that there was no scope to reduce the hosting costs despite lower-than-anticipated user numbers. The hosting arrangement and its pricing was – with the benefit of hindsight – not cost-effective from a project perspective.

Unfortunately, lack of detailed reports of actual expenditure makes it impossible to assess the cost-drivers behind budget line items and their relative financial efficiency, such as advertising, the Pondering Panda surveys, and the dashboard.⁴⁶ Notwithstanding this, though, inspection of what was delivered does not seem to justify the budgeted amounts. For example, the price of Pondering Panda surveys seems high for the scope of the surveys proposed and reported on. The Reach Trust CEO provided us with quotations which indicated that the Pondering Panda rate charged to Mxit was a 33% discount on their corporate rate. However, there was not a transparent or competitive process for the selection of Pondering Panda to be the service provider, so it is difficult to determine how this pricing would compare with equivalent services available from other firms.⁴⁷

Further, it is unclear why the project required a dedicated budget line for quarterly reports when it also had a full-time project manager and project assistant, both budgeted at very attractive monthly salary rates that were presumably sufficient to attract highly competent individuals⁴⁸. It could be argued that the project manager was not funded by UNICEF, but we are considering the budget line items in this process and not who contributed to each item.

In addition, the budget proposed extensive investment in the dashboard facility, which seem reasonable if compared to the specifications. However, the specification was not delivered in its entirety. Without detailed financial reports, it is not possible to assess where the budget allocated for the dashboard was re-deployed. Finally, although the travel and workshop costs mostly appear legitimate, there were potential efficiencies (savings) to be gained through reduced travel and more tele-conferencing.

Project partner perceptions of cost-effectiveness

None of the project partners tracked costs against the project deliverables and monitoring and evaluation framework. When asked about cost effectiveness, very few project partners commented. Thus, this question was not answered by enough people to enable analysis of answers.

Project partners were also asked to rate their perception of the cost-effectiveness of the UVS. Their responses are presented below.

Table 32 *Project partners' perceptions of the cost-effectiveness of the UVS (n=7)*

Response	Very poor	Poor	Adequate	Good	Very good
Number of responses	1	0	3	0	3

Estimated costs to beneficiaries

When considering costs, it is appropriate to consider the costs borne by the beneficiaries for devices and for data. The UVS made use of a 'Bring Your Own Device' and 'Bring Your Own Data' model of access.

In the beneficiary survey, learners, teachers, and parents were asked to indicate the replacement value of the respondents' cellular phones and the average total monthly spend on airtime and data (combined).

46 Since the *ukuFUNda* project UNICEF has moved to activity-based budgeting to deal with these very type of issues (personal communication, Saadhna Panday-Soobrayan, 28 July 2016)

47 The Reach Trust CEO has indicated that Pondering Panda was 'the only company with a mandate to conduct surveys across the entire Mxit user base (Andrew Rudge, personal communication, 21 August 2016).

48 Andrew Rudge commented (7th July 2016) that this line item was added only because it was in the UNICEF budget template provided to him. However, since a project manager and assistant were already in the budget (and this task would have been part of their basic job description), the quarterly reports line items could/should have been zero-rated

Figure 65 *Replacement value of learners' cellular phones (n = 68)*

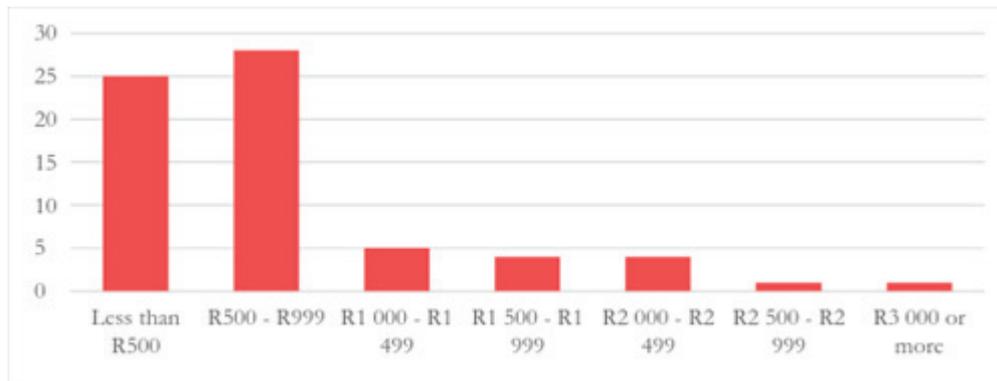


Figure 66 *Replacement value of teachers' cellular phones (n = 24)*

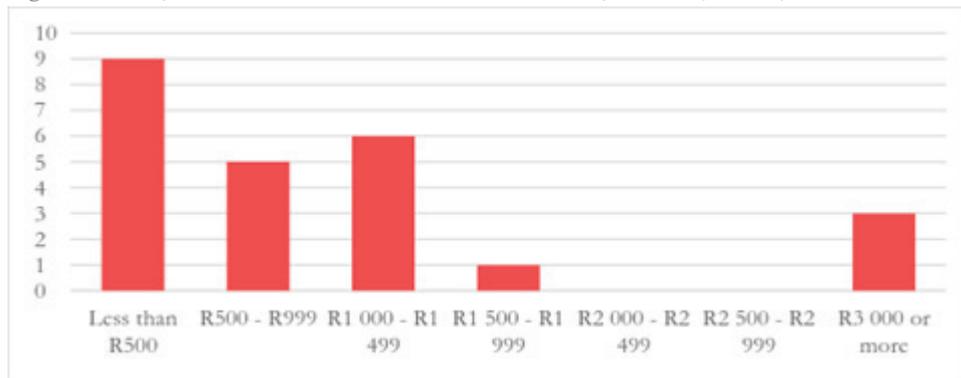
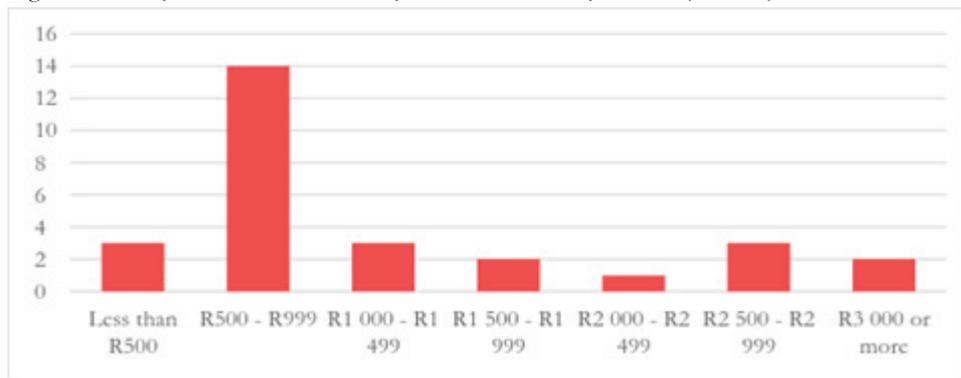


Figure 67 *Replacement value of parents' cellular phones (n = 28)*



A calculation of the estimated mean replacement value of the cellular phones of the members of each group gives the following figures:

- Learners: R864.
- Teachers: R1,173.
- Parents: R1,332.

As can be seen, all three groups used cellular phones that are towards the cheaper end of the spectrum. Not surprisingly, the group with the cheapest phones on average is learners, with 78% of respondents using a cellular phone with a value below R1,000 and the estimated mean being R864. Surprisingly, perhaps, considering that teachers are typically in full-time employment with a reasonable salary, the estimated average of a teacher's cellular phone (R1,173) is less than that of a parent (R1,332). The low values of the phones of these respondents suggests that many were probably using feature phones (rather than smart phones).

We turn now to consider the reported cost of data incurred by each beneficiary group.

Figure 68 *Learners' average monthly spend on airtime and data, combined (n = 68)*

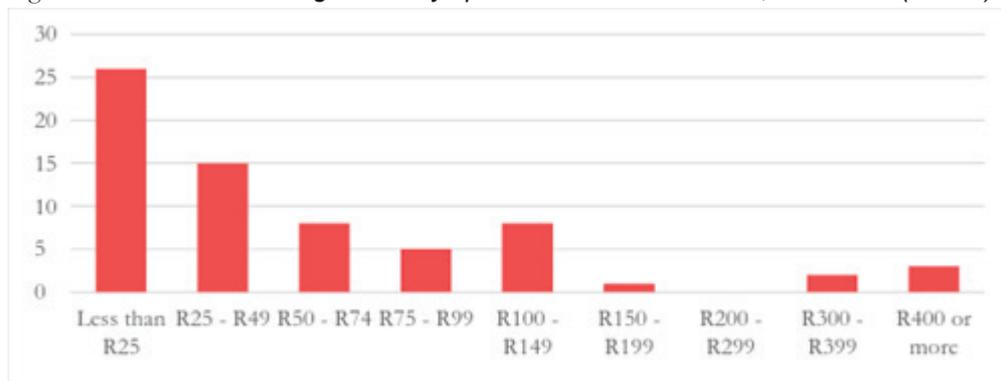


Figure 69 *Teachers' average monthly spend on airtime and data, combined (n = 24)*

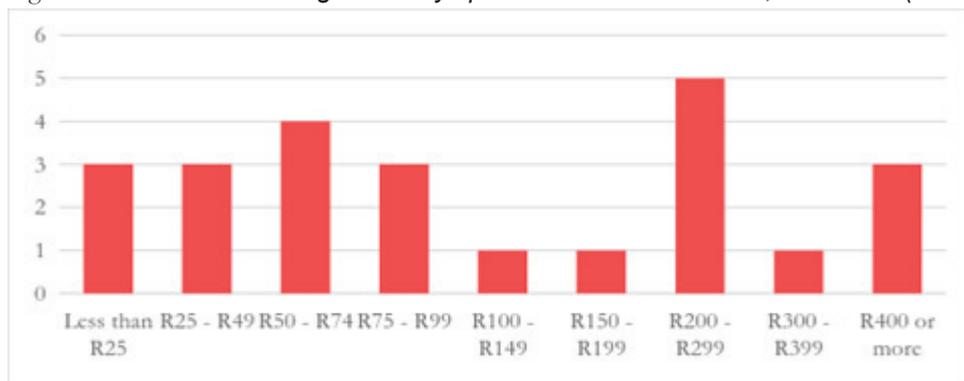
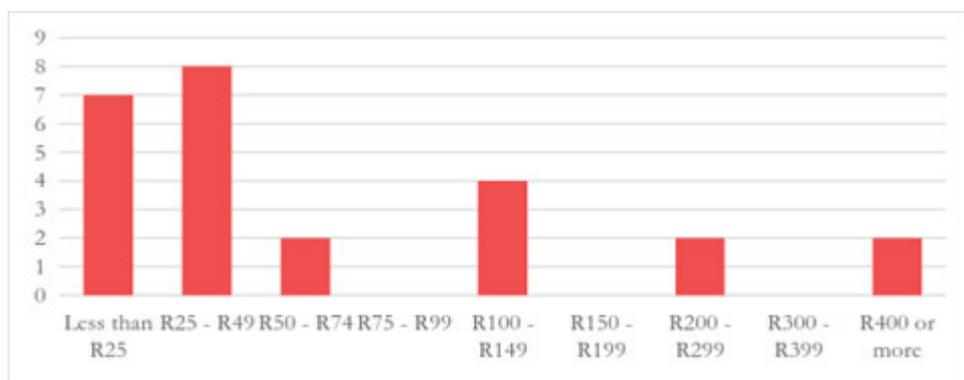


Figure 70 *Parents' average monthly spend on airtime and data, combined (n = 25)*



Calculating the estimated mean monthly spend on data of the members of each group yields the following figures:

- Learners: R76.
- Teachers: R164.
- Parents: R98.

The modal category of the amount of money spent by the learners is less than R25 per month (38% of learners estimated that their expenditure fell in this lowest category). For parents, the average monthly expenditure is higher (at R98), but 60% of the parent respondents spent less than R50 on airtime and data per month. The expenditure of teachers is, as expected, far higher, with an estimated mean of R164 (albeit from a widely ranging set of spending data), which is more than double the learner's mean monthly expenditure on data.

Table 33 *Reported costs to end users for access to devices and data*

Beneficiary group	Mean replacement value of device (Rands)	Mean monthly data cost (Rands)	Estimated data use over 16-month period
Learner	864	76	$76 \times 16 = R1,216$
Teacher	1,173	164	$164 \times 16 = R2,624$
Parent	1,332	98	$98 \times 16 = R1,568$

The above table presents reported data use on a monthly basis, but this does not distinguish data use for the UVS from data used for other purposes.

As described in the earlier section entitled ‘effects as evident in usage data’. It is unfortunately not possible to provide an clear sense of usage generated specifically by UVS as the data we have shows only (a) ‘views’ and ‘posts’ generated as a user moved through the UVS ‘door’ in order to access the underlying apps, and (b) ‘views’ and posts’ generated by usage of the underlying apps (without separation of usage by access through UVS from usage by direct access.

In the case of (a), the process requires little data usage and so it is not surprising that this usage data generated low costs (in the order of a maximum of R4 per user over the 16 months under evaluation). In the case of (b), it is not possible to make any reasonable estimate of the cost of using the underlying *ukuFUNda* apps due to access through the UVS, as this data is not available.

However, an indication of how much it costs to access the apps on the UVS is possible. It has been measured that ten minutes of constant use on the UVS would require approximately 500kB of data (Andrew Rudge, personal communication, 21 June 2016), which would have incurred a cost of around R1.00 during the period of evaluation, giving an hourly cost of R6. However, all users using a Cell C SIM card were able to access the UVS until end March 2015 without incurring any data costs.

Sustainability

As sustainability of a service depends on what the service is trying to achieve, we have considered the m-learning affordances (potential ways in which mobile technology can be used to enhance learning) and m-learning configurations (potential ways in which m-learning services are designed or intended for use by learners) to present information obtained from project partners and app/content service providers.

Their views on the current partnership model and possible sources of income for sustaining the UVS into the future are also presented.

M-learning affordances

We asked project partners to rate, and comment on, the importance of each of the m-learning affordances for UVS, using a scale of 1(not at all important) to 5 (important).

Table 34 *Project partner rating of the importance of m-learning affordances to UVS design*

	Reach Trust 1	Reach Trust 2	DBE 1	DBE 2	U N I - CEF 1	U N I - CEF 2	Mode	Median
Accessibility (access to learning materials, reference materials, experts/mentors, other learners)	5	5	5	5	5	5	5	5
Big-data and predictive analytics (making use of data tracking and large reach to analyse trends, and respond to perceptions)	4	4	5	4	4	4	4	4
Immediacy (on-demand learning, real-time communication and data sharing, situated learning)	4	5	3	5	4	4	4	4
Intelligence (advanced features making learning richer through context-aware features, data capture, multimedia)	3	4	2	5	4	4	4	4
Individualization (bite-size learning on familiar devices; promotion of active learning and a more personalized experience)	3 (personalized: 2, bite-sized: 4)	3	5	5	3	3	3	3
Context management (making use of the users' location to offer tailored information)	3	2	3	5	3	3	3	3

Project partners (n=6) were unanimous that the most important m-learning affordance was accessibility, in terms of which making learning resources and materials available to as many learners, teachers, and parents as possible was the main priority. This was confirmed in their comments on accessibility:

- *The key point! Making a broad range of services available on many devices.*
- *The main reason for using Mxit as the platform.*
- *Point to help learners when they are at home.*
- *In context of lack of access to educational resources (including digital resources), this is very important consideration.*
- *This was the whole basis for the project. Learner materials were not accessed by learners, and this was meant to be another way of accessing materials.*
- *The main issue was providing access to extra materials for learners and educators.*

The m-learning affordances of big data and immediacy were also considered important by most project partners, although there was less commonality on these. The comments on big data made reference to the dashboard functions as illustrating this affordance, while the teacher communicator was expected to 'play a demonstrative role in showing how big data could be possible through mobile phones'. The dashboard component was able to gather self-reported data from learners at registration, but did not offer the big-data affordance of being able to monitor and respond to observed patterns and trends (which would have been possible had the dashboard included usage data). The immediacy affordance was described as the UVS providing a 'tutor and counsellor in your pocket', offering 'real-time communication and on-demand learning', and allowing 'learners and teachers to engage with the structure of the CAPS curriculum delivery plan' (such as providing pace setters, and/or reminders about which topics ought to be in focus in a particular week). These components of the UVS were, however, available through the third party applications, and we were not

provided evidence of their monitoring and responding to the 'immediacy' functions. Thus, it is not possible to determine whether or not these functions were used and the extent to which learners, teachers, and parents using these services experienced these as described by the project partners.

The m-learning affordances of individualization, intelligence, and context management were ranked as less important by project partners. There was general acknowledgement that the UVS did not offer a personalized experience, but that bite-sized chunks of information were available. In our review, we found no functionality which allowed for different experiences of the UVS based on responses to questions, although users could navigate through menus of options and select those sections of interest to them. The intelligence affordance was also deliberately limited, as the UVS was designed for feature phones and was intended to be light on data. For this reason, the content was primarily text and images. Context management was 'not a priority' and 'not a major consideration in the design'. In our review of the UVS, we did not find any context management features, besides data collected from the registration process, which allowed self-reporting on school affiliation (and therefore location), and the fact that messages could be sent to specific user groups (e.g. all users in a particular province).

Figure 71 *M-Learning affordances: The priorities*

M-Learning Affordances

Making learning resources and materials accessible and available to as many learners, teachers, and parents as possible was the main priority



M-learning configurations

We asked project partners to reflect on their vision/intention for the UVS in relation the m-learning configurations.

The 'learning spectrum' ranges from formal (in class, in school) to informal (out of school but formal learning, and/or informal learning for pleasure or entertainment). Project partners agreed that the UVS was intended to target the middle of the learning spectrum. The UVS was described as offering psycho-social support and academic content in support of the formal school curriculum; but the usage of the UVS was expected to be out-of-school time:

- *Big focus on psycho-social aspects – helping them address their troubling issues. Biased towards more formal learning environment in the sense that it would be used by learner for school – but outside school time. An extension of the school; supplementary source, supporting formal learning (e.g. Maths) but also reading for pleasure and trivia – people could access whatever they chose.*
- *More informal – definitely out of school. Learning curriculum but at their own pace and what they wanted to look at.*
- *Towards informal end – less on academics and more on psycho-social. Academics came later because existing apps could be used. FunDza – informal learning (reading a fun book).*
- *It was in the middle – supporting formal learning, but outside of school. When it came to teachers then there was more emphasis on in-class use but that requires a whole shift in how schools work.*

The 'kinetic spectrum' ranges from learners being stationary to being mobile. Some m-learning interventions are specifically designed to take advantage of the portability of the device between home and school and/or to allow learners to take the device to a particular location as directed by the service. By designing for mobile devices from the outset, it was acknowledged that learners could move with their devices:

- *Mobile...Replicating school facilities for the poor.*
- *Mobile – able to do it anywhere and anytime.*
- *Completely mobile.*
- *Users were not expected to be stationary. They did not have to use the service at school. They could still collaborate with groups of teachers or learners either outside of their school or within their school.*

The 'collaborative spectrum' ranges from individual to collaborative. Some m-learning services are designed for users to engage with materials on their own, while others deliberately facilitate collaboration between users in relation to particular content areas. Project partners commented on this spectrum with regard to the UVS as follows:

- *Both [individual and collaborative]: learners working alone but also collaboratively with other learners and teachers*
- *Individual – e.g. learner and counsellor.*
- *[UVS is] aimed to encourage collaborative (e.g. created mechanism whereby teachers could set tasks for learners in their class – but few teachers utilized – needs behavioural change) – but mostly individual access. 80% of apps were utilized in individual setting.*
- *In terms of individual devices it as more on the individual end, but there were some components (such as groups) which allowed for collaboration*

There were mixed responses to this, because answers were different depending on which application was under consideration. Some of the applications, such as the teacher communicator, were intended for collaboration. There was an expectation that teachers would form 'communities of practice' and use the UVS as mechanism to communicate in groups (though this did not eventuate). Other applications, such as access to a helpline as part of the psychosocial service, would necessitate individual engagement by a learner.

The 'access and affordability' spectrum ranges from free public access (public provision of a device and free data) to individual users bearing all costs (BYOD and user-paid for data). It is useful to separate this spectrum into its two components:

- Access refers to owning or borrowing the technology hardware or device(s) used to make use of the m-learning service; and
- Affordability refers to cost of the hardware device; any licence fees or subscription relating to making use of the service; as well as the data costs associated with using the device.

In relation to the access component of UVS, project partners all agreed that a BYOD approach was adopted. The UVS was designed to reach as many teachers, learners, and parents as possible within this approach and so it was decided to design for basic feature phones. There was an explicit intention to only require access to a simple device (the service worked on 10,000 different phones, according to Mxit/Reach).

There were no licensing or subscription costs for using the service. This was reflected upon by one of the project partners, who noted that this design decision may have limited the sustainability of the UVS and limited users' options to choose suitable materials and services. It was thought that a mixed approach to licensing and subscription of particular applications (and/or components of applications) may have provided a wider range of services to learners, teachers, and parents:

[One of the South African provinces] makes a distinction between proprietary and open applications/ services which allows users to make a choice. I think this model is constructive as this allows schools to also source proprietary services (where there is a subscription fee) such as Mathletics, class dojo, Singapore maths, cyberwall.co.za, maths&science.co.za; PaperVideo etc.

The project partner therefore questioned the basis on which third-party content providers were selected for inclusion in the UVS, and argued that, by limiting the selection to only open-source and free resources, all proprietary services (which generate revenue in some way) were excluded. It was felt by this individual that the target audience ought to have been given all available information about psycho-social services and academic content that met DBE quality standards. This issue was not raised or discussed with other project partners, but it was noted as an area for possible further discussion and agreement.

Users were expected to pay for their own data, but the design was deliberately restricted to text and some images to keep the UVS 'data light'. In support of this objective to make the UVS affordable to all users, and in particular learners and parents of low socio-economic-status, there were also attempts to have the data zero-rated. However, the data relating to UVS was zero-rated only for one mobile operator (Cell C). This was considered unfortunate by the project partners, who considered a zero-rated service to be an important component of the affordability of the UVS. The following comment from a project partner suggests that, as a result of the UVS exploration, there is greater awareness within the DBE of the need for public access to free data for health and education purposes, and that this should form part of a broader public sector initiative:

We [colleagues at DBE] now [having worked on UVS] have a bigger vision of innovative ways in which we can collaborate with the private sector. This requires an integrated approach involving DBE and Department of Communications (DOC) with regard to data connectivity, which we see as an important business sector contribution.

Considering the pedagogy spectrum used for describing m-learning interventions, we asked project partners whether there was a common approach to pedagogy or theory of learning which informed their work on UVS. Most of them indicated that there was not a common theory, commenting that each application made use of its own approach to pedagogy and theories of learning. The UVS experience, however, prompted project partners to reflect critically on what they viewed as current trends within the DBE in relation to m-learning, e-learning, and pedagogy more broadly. One project partner identified a state of transition:

What is currently happening in the department is seeing m-learning and digital learning as being in transition. The DBE is looking at what is available to assist in the journey towards e-learning integration into schooling. The existing white paper on e-education attempts to give a guide with regard to pedagogy and guidelines. The updated teacher development guidelines include reference to teachers use of ICTs to support their administrative roles and their own m-learning pathways/options.

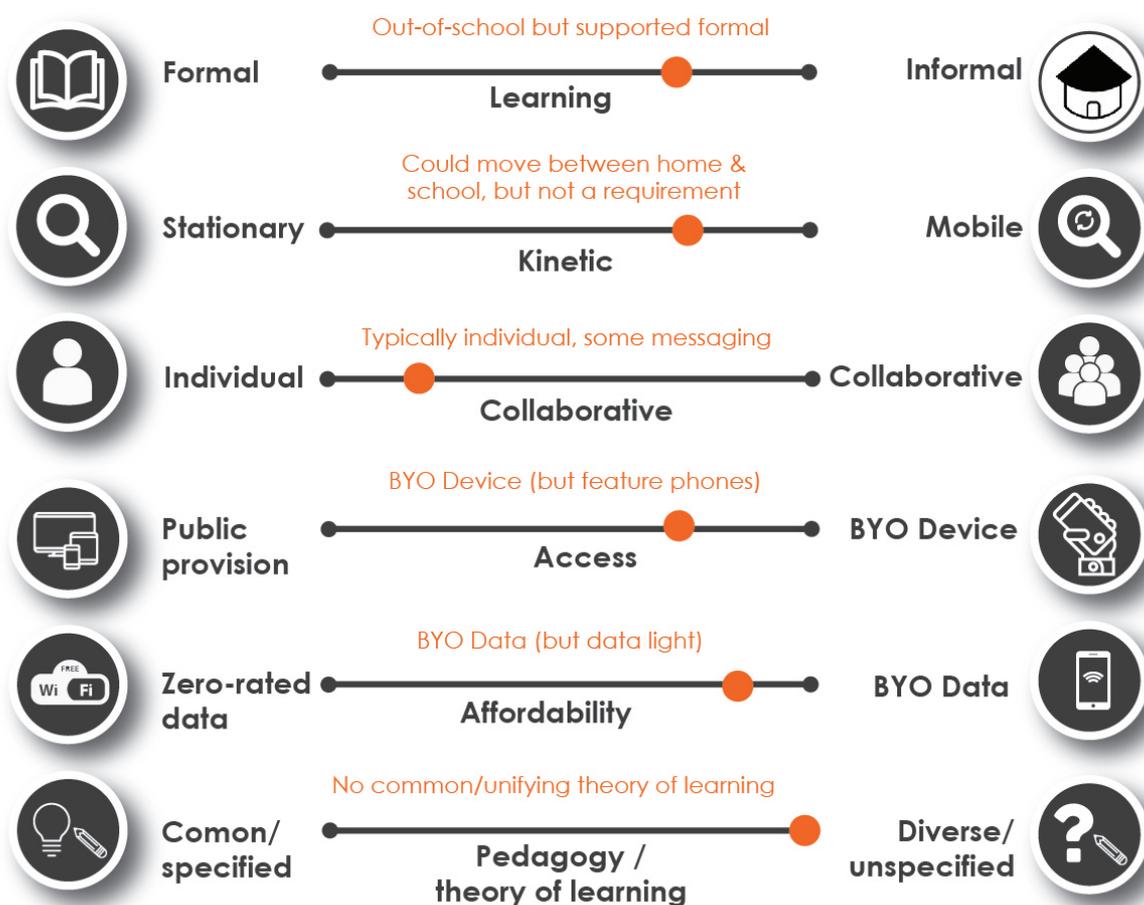
This comment acknowledges existing DBE policy frameworks, but identifies a 'journey towards e-learning integration'. It suggests that more traditional paper-based learning materials are starting to be augmented with digital options. UVS took place within this exploratory context. Another project partner was directly critical of the current approach to pedagogy within the DBE:

I am not content with the way in which pedagogy is conceptualised in the DBE. It is very teacher-centred and focused on traditional approaches such as coverage of the curriculum; time on task; and standardised testing in the Annual National Assessment (ANA) and National Curriculum Statement (NCS) processes. The whole system seems to work around that with a big push to increase test scores. The UVS offers a disruption to that mentality. It is more flexible. The rationale for me was to disrupt the system and offer better learning for all (both teachers and learners). But there is a big disconnect between how DBE works and how UVS works.

Thus, the UVS was seen by this individual as 'disrupting' the current approach to pedagogy within the DBE, although difficulties in changing DBE practice are also acknowledged. UVS was seen as an attempt to try something new and different within the established bureaucracy.

Figure 72 M-Learning configurations for UVS

Key Findings: UVS M-Learning Configurations



Reflections on the partnership model

Project partners were asked to reflect on the partnership model and contributions being made by each partner. As these perceptions were from the project leadership, which comprised four people, we simply describe the main issues emerging. The DBE was described as ‘adding credibility to the offering’, facilitating access to other units with the DBE, and allowing for work at different levels within the bureaucracy. The DBE was considered to have strong project management; and was thought to have sought to ‘do things in a cost-effective manner and using the participation of other partners and processes’. The UNICEF contribution was also considered in relation to its international profile, credibility, and ability to open doors to other relationships. UNICEF was considered to have brought in strong oversight and accountability functions. The Reach Trust was considered to be the technical partner, which brought both ‘technical know-how and implementation expertise’, an existing social media platform, and had contributed its existing relationships with third party application providers.

There were mixed views on whether the partnership model worked successfully, with all parties mentioning some frustrations and concerns, while acknowledging that much had been learnt from the UVS process.

The first concern related to differences in pace of implementation, combined with the need to have a stable enough intervention to allow for its effect to be monitored. This is probably an inevitable tension between a technology implementation partner, which is small and trying to be responsive to a rapidly changing technology environment, and a large organization responsible for a large-scale system of education, where buy-in and high-level political support for decisions is required. In this regard, the lack of dedicated capacity within the DBE to champion ICT use and adoption

in schools (and in which an exploratory service such as UVS would sit) was identified as a significant constraint. Simultaneously, concerns about the Reach Trust and its rapidly changing scope and consequent inability to monitor, test, trial, and then improve the UVS were raised as concerns:

- *The technology environment changes so fast. Before we had a chance to really test and monitor use, Reach Trust was proposing something different. So the original ideas were not implemented, and there were second and third versions. The implementing partner needed to give a sense of how long something would last, and best-tested/trialled to improve. But the parameters changed all the time, so really nothing has been measured yet.*
- *It has been difficult at times. Reach Trust has gone ahead with new enhancements and versions, which have not had the approval or involvement of the other partners⁴⁹.*

In response to this requirement to be specific about what was being attempted and how it would be evaluated, UNICEF introduced the 'results matrix' which subsequently framed this external evaluation process. It was suggested that the evaluation process should have commenced at the outset of the project, rather than after implementation. There was a further suggestion that the intervention should have been on a more limited scale, perhaps focusing on a single province, before being made available nationally.

The second area of concern relating to the partnership agreement was the treatment of Intellectual Property (IP) within the partnership. The DBE and UNICEF indicated that they did not know what IP arrangement was made between the Reach Trust and the third party application providers, as these were managed by Mxit⁵⁰. UNICEF indicated that, in its most recent contracts, IP of products developed now has to be explicitly defined and that this would be done in future. Once again this was framed as positive lesson derived from the UVS experience:

- *We have learnt through this project, and in future we would consider the IP aspects of the partnership agreement from the beginning.*
- *There was no reference to Intellectual Property in the initial contract. This has already been changed as UNICEF's new contracts include explicit reference to IP and agreeing on this with a service provider and or partner.*

Linked to this, the DBE and UNICEF raised a concern relating to the development of a new application called 'Level Up', which drew on the experiences of UVS. This was implemented through funding from a different donor, and without a contract extension from DBE and UNICEF. Although, between March and August 2015 the UVS was maintained at no cost by The Reach Trust, from September 2015, a new donor previously uninvolved in the UVS invested in the platform

The third area of concern was the alignment of the service with internal processes within the DBE, coupled with a lack of an ongoing maintenance and marketing budget. For example, project partners hoped that further funding would be obtained from DBE for a 'Back to School' campaign in 2015 and that advocacy for the uptake and use of the service would take place through DBE structures. Here, mention was made of the different roles of provincial and national departments of education, where the national department is responsible for standards and policy, while provincial departments have their own implementation strategies. There was general acknowledgement that encouraging usage required far more advocacy and marketing than had been undertaken. Suggestions to include incentives for use, and have a dedicated 'activation' process which required school level engagement was considered necessary.

The main issue is that the ongoing financial implications were not thrashed out. There were more [higher than anticipated] maintenance, layout and ongoing costs which DBE was expected to pay going forwards.

49 It should be noted that this is the opinion of one of the project partners. It appears to be a misconception as there were no new versions of ukuFUNda, just various apps being added or removed. However, the quote does nonetheless indicate a level of concern or discontent by the individual for the partnership.

50 According to the Reach Trust CEO, the IP of all apps developed specifically for the UVS was shared by all partners. However, the IP of all 3rd party apps that had been created prior to the UVS did not transfer to the partnership. This, he feels, 'was discussed with UNICEF from the outset' (Andrew Rudge, personal communication, 21 August 2016)

Finally, concerns were raised about ‘transparency’ within the partnership relationship. This concern related to the Reach Trust not providing usage data, as well as lack of clarity about the connection between the budget and the related scope (for example, the DBE was not aware of the budget structure and agreement). There seemed to be a separation between project implementation processes and financial management, with no clear alignment between the original budget and the changed results matrix.

- *Partnership arrangements work well, and have worked well in other contexts. The key issue seems to be the importance of being jointly responsible for the results and the expenditure. This can only be done meaningfully if UNICEF has the capacity and experience in the area being entered into. ICT and mobile learning was not an area of UNICEF expertise when this was first entered into.*
- *In a partnership it is important to jointly conceptualise how to achieve the results. In such cases the connection between the management of finances (and value for money/ cost effectiveness) must be strong. This was unfortunately not the case for this partnership.*

These concerns and challenges were identified in the context of managing risk when exploring a new innovation. Likewise, there were comments about managing risks associated with the choice of platform:

- *It is important to consider the partnership in the context of the risks associated with new technology; and the ICT landscape at that time.*
- *The innovation was attempted and there were risks; however, there were also potential benefits. In the fluid and changing landscape of technology; the agreement with Mxit could have meant a relationship with ‘the next Whatsapp’ which could have been very beneficial for UNICEF. As it turned out, Mxit use was declining, and the intervention was therefore not as successful as was initially hoped for. UNICEF partnered and piggy-backed on either success or failure.*

The UVS was valued as an opportunity to gain experience and learn from the exploration this allowed

- *The UVS evaluation provides a basis for us to learn how what it means to provide such a service to our ‘constituency’ as the DBE.*
- *There will probably have to be third phase of investment from the partners. We have learnt a lot, and we must take these learnings and work from them.*

Perceptions on the future of UVS

Given the opportunity to reflect on efficacy, project partners were asked to describe the functionality, envisaged uptake, and technical alternatives for UVS in the future. This led to discussion about both weaknesses and learning from the UVS intervention.

Some project partners felt that the UVS scope had been too ambitious and not targeted enough for particular audience and purposes:

- *What has been built is more than what has been utilised.*
- *Change to a ‘light then full’ approach. A light version would require an easier registration process and then users can engage. Focus on building awareness and establishing trust first, thereafter lead/coax into full version.*
- *UVS can’t be all things to all people. It needs to be designed to be specifically relevant to the needs of a particular targeted audience.*
- *We need to relook at whether a portal is right approach (versus a few targeted services which are researched and improved over time).*

It becomes clear from these comments and discussions that project partners had different conceptualizations of the next phases and priorities⁵¹. Some respondents felt that trying to address parents, teachers, and learners through a single platform was not viable. There were suggestions to split the audiences and particular functions targeting them into separate interventions, as well as to revisit the technology platform choices, and to plan better for and manage the ongoing maintenance, hosting, and effective costs of platform use.

Project partners recognized that different components of the DBE required different kinds of applications and/or mobile services. A means of contacting and communicating directly with all teachers emerged as a DBE priority, but the appropriate technical platform for this is not yet clear (WhatsApp, Facebook, Twitter, etc. were all mentioned as possible alternatives).

If we do not address some of the critical deficiencies in the partnership, the platform and the requirements for hosting, managing and implementing a large scale mobile learning solution, then UVS will die a natural death. There are many other offerings on the 'market' and the learners and teachers will vote with their thumbs as to what works best for them - provided of course, they know about such offerings.

It was felt that information for teachers would need to be tailored and carefully designed for particular kinds of teachers, paying attention to the grade, and particular subject area/specialization. It was further recommended that such a teacher m-learning application could be sensibly integrated with professional development options, and possibly linked to the continuous professional development requirements of the South African Council of Educators. The context management affordance of m-learning could link teachers to locally relevant information about upcoming teacher development opportunities/training.

When encouraging project partners to reflect on future UVS requirements, we asked them to give an indication of their uptake projections for UVS in the future. There were differences amongst partners here (which depended on their prioritized target audience and the way in which they conceptualized the UVS in future):

- *From the teacher development perspective, the service should target all teachers. So it should aim to reach the total population of teachers by 2020.*
- *We need to reach 20% of teachers to get critical mass – 20% to be skimmers. Perhaps 90:9:1 (skimmers: duckers: divers).*

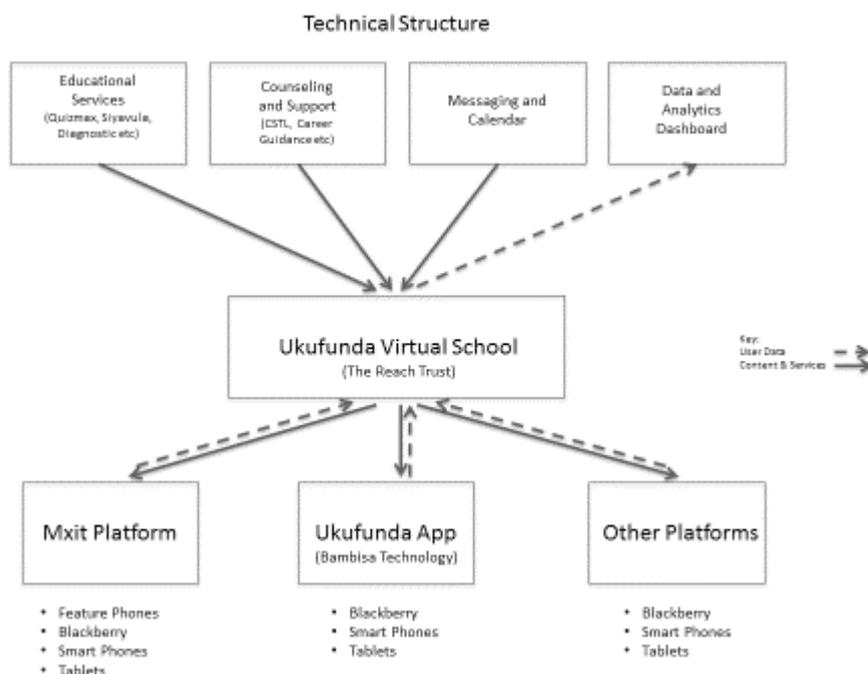
So while there was an ambition by some to reach 'all teachers', others considered 20% of teachers to be a viable target. There was also greater awareness of different levels of use, possibly reflecting knowledge gained through this pilot implementation period.

In relation to technical alternatives, there was general agreement that, for the teacher audience, their greater access to smartphone devices in recent years was a major consideration for future UVS models. At the same time (within the constraint of using a BYOD model for teachers), it was considered important that the UVS platform should work on any device, including feature phones, as the 'equity imperative is one of our most important goals at the DBE'.

The following diagram for a possible future technical structure for UVS was presented to project partners by the Reach Trust [e-mail, 22 April, 2015].

⁵¹ However, this is not surprising since the team had decided to first wait for the evaluation findings before sitting down to discuss the next steps.

Figure 73 Possible future technical structure for the UVS (source: Reach Trust)



There was, however, no clear agreement on the technical considerations and functionality requirements of the UVS in future, which will presumably be shaped by the lessons documented in this evaluation report.

Because there is not yet consensus on the most appropriate future functionality, focus, and reach, it is not possible to estimate potential future costs. There was acknowledgement that there would need to be a rebuilding process, which would depend on technical platform/s selected and which functionality is retained or enhanced. Questions were raised about 'what it takes to manage the technical back-end and what the cost implications are' and it was felt that 'we [the DBE] absolutely need to have dedicated human and financial resources to drive the use of all of our digital resources. This has been under-estimated.'

Considerations relating to future income were similarly vague (and an obvious outcome of the acknowledged lack of clarity relating to future scope). Some project partners suggested that advertising revenue and/or corporate sponsorship was a possibility for UVS in the future:

- *Advertising revenue.*
- *There is an appetite amongst corporates for sponsorship – switch to social cause marketing, such as an education initiative like UVS. Advantage of brand association for the sponsoring company. Easier to manage than a large number of advertisers.*
- *Advertising revenue could be driven by the implementing partner. It would be governed by ethical guidelines (such as advertising standards for children as used by SABC). This is being considered for the teacher communicator application.*
- *Any revenue streams would be expected to go back into the running of the service (and not extracted as profit). In this way the platform would become self-sustaining and not require ongoing investment.*

Others considered that, if the UVS functionality was in support of the DBE's public education mandate (such as communicating with its teachers or delivering quality learning materials), then the service ought to be funded from the DBE budget:

- *The DBE could continue to fund the intervention. There is particular interest in the feedback obtained through Pondering Panda surveys and also the 'teacher communicator' app.*

- *It is not known whether UNICEF would continue to support this initiative. Part of the evaluation process is to get a sense of effect and possible future directions and needs.*
- *I think this was a relationship where it was known that the objective is to get the materials out to teachers and learners. Someone (DBE and UNICEF) had to pay for that, and that's why we were involved. This was not something where it was expected that there would be revenue.*
- *Provinces should pay cheaply for communications with teachers and learners.*

App/content service providers agreed with this sentiment, and thought the UVS would need to be continue to be funded by the DBE and UNICEF. They did not have many specific suggestions as to how the UVS could generate income. Options provided were to charge for advertising and/or charge users for the service. However, as one service provider pointed out, the latter option has serious negative consequences: 'A subscription service means that learners from poor communities miss out'.

When asked whether the organization they work for would consider making a monthly contribution to stay on the UVS service, not one service provider (n=7) said they definitely would make a monthly contribution⁵². The majority (five out of seven responses) said they would not support it.

⁵² The rationale for asking this question was that a possible alternative sustainability model could be to have content providers contributing towards sustaining the UVS service.

CHAPTER 5: LESSONS LEARNED, RECOMMENDATIONS AND CONCLUSION

The UVS focused on equity/redress and targeted rural and poorly resourced beneficiaries by choosing a platform (Mxit) that was affordable (cost-effective) both in terms of data usage and accessibility on lower-end phones (feature phones), not just smartphones. The partnership agreement was intended to create an innovative space in which exploration and experimentation could occur. The development of the service was innovative; perhaps even the first example in the world of a mobile-based virtual school that collates apps in the way that the UVS did. In addition, it adopted a holistic approach covering both psychosocial support and academic learning materials. In the context of high levels of poverty in South Africa, experimentation with this type of affordable technology is laudable.

Lessons learned

From this innovative environment and the various developments that unfolded within it over the period under review, several useful lessons have been learned, which are documented below. These might usefully inform future development of UVS and other similar interventions harnessing ICT to support education, both in South Africa and other developing countries.

Lesson 1: There is appetite for digital content and m-learning services

The responses from beneficiaries indicate that there is demand for m-learning services in support of educational processes. The beneficiaries valued the accessibility of digital learning materials and psychosocial services, but requested that these be provided on a more widely used platform than Mxit.

Lesson 2: Invest in the conceptualisation phase of programme design

The conceptualisation phase includes both the clarification of the programme design, and the evaluation design. This phase appears not to have been adequately attended to and there were clear shifts in conceptual approach and focus during the implementation period for UVS. Changing project designs midway through a project can lead to a lack of direction and focus. The process of getting a shared understanding between partners which allows for a common purpose and monitoring and evaluation framework to reflect on impact takes time. This ought to take place from the outset of the intervention and monitoring and evaluation process should be established in these initial stages. A commonly-shared and documented theory of change between all partners, defined prior to implementation, can help to ensure that all have a common understanding of the intervention.

Although designing for scale is important; there is substantial risk in implementing services at scale without adequately testing the uptake and use of the services by a sample of the targeted population. Piloting an intervention at a smaller scale is an important prelude to rolling out the intervention at scale.

Lesson 3: BYO-Devises approaches can be adopted for m-learning interventions targeting secondary school learners and teachers

At secondary school level the majority of learners have access to a mobile device. Provided there are efforts to ensure that the minority of learners who do not own mobile devices, are provided with devices; BYOD options can be pursued. Most teachers have access to a mobile device, and so BYOD options can be pursued for m-learning interventions.

The UVS aimed to meet a need for an educational service accessible to (almost) all in the education system in South Africa; not just those with middle- to high-incomes. This equity requirement to meet all learners, however, does reveal a need to target particular audiences and understand their circumstances. For example, if quintile 1 high school learners in the Eastern Cape are targeted, their BYOD profile is likely to be a feature phone or no mobile phone. In contrast, Grades 10-12 learners in Gauteng may have access to tablets provided by the province. Given this, pro-poor strategies that target resource investments into low income communities may be more appropriate and cost-effective than universal distribution of hardware to all. There are considerable potential savings if a BYOD approach was adopted in m-learning intervention.

Lesson 4: BYO-Data services exclude vulnerable audiences from public services

Despite attempts to keep data costs low in the design of UVS, educational engagement with learning materials and psychosocial services require extended periods of time to realise hoped for impact. Data costs were a recurrent concern from all beneficiaries. Educational and health service m-learning services should be zero-rated by all cell phone service providers, if this is feasible.

Lesson 5: Providing access to digital materials and services does not lead to use

While UVS showed that using a BYO-Device model a large sample of learners could be reached; this did not translate into sustained use of the educational and psychosocial services. Processes to motivate and sustain engagement with materials and services are required; if changes in learning outcomes are expected. M-learning interventions require a detailed plan for activation, marketing, and communication as providing access to resources does not automatically lead to usage, or changes in educational outcomes. Uptake and usage data needs to be reported on regularly, and accessible remotely by project partners. Invest in processes to drive uptake and ensure that uptake metrics are reported via an application backend that is accessible online

Lesson 6: While social-networking platforms can be used to reach audiences (learners, teachers and parents) educational services require more than 'an audience' to be effective

In media platforms and marketing environments the existence of 'an audience' for programming or content is a sufficient measure to secure advertising and further revenue or investments. This is not the case in the educational sphere. To aim for improved learning outcomes it is necessary (but not sufficient) to deliver the learning materials to the targeted beneficiary. Sustained and meaningful individual engagement with the materials is necessary to result in the hoped for learning gains. Learning is not something which can be received or delivered, rather it requires the active participation and engagement from the targeted learner – who is ultimately responsible for the learning gains. This process can be supported by caring adults (such as teachers and parents), but cannot take place in the absence of the learner themselves.

By choosing to deliver learning materials via a social media platform, UVS found a youth audience. However this did not translate into sustained use of the educational materials, which could be sufficient to improve learning outcomes. The UVS provides an example of meeting the audience where they are socialising (on MXit). However the UVS case demonstrates that when the social networking fad changes (MXit user-base was in decline), and the educational investments have been tied to the social networking platform; investments are lost. The audience moves, and the educational service cannot. There is therefore a need to distinguish marketing and advocacy for the service (which could be done via a social networking space) from the educational and psychosocial services. Content development investments, and the related Intellectual Property of the educational content must allow for flexible re-purposing or re-use in new technical platforms. Given the rapidly evolving nature of the ICT industry, app designs need to as far as possible be kept independent of potentially transient trends in technology use in broader society.

A comparison to the print materials context may be helpful when reflecting on this lesson. The DBE has invested in quality learning materials for each South African learner in priority subject areas; with the provision of termly workbooks in primary school (Grades 1-7). The challenge in delivering the workbooks and ensuring that they reach the schools, classrooms and ultimately the hands of the learner for whom they have been intended is a major undertaking. This has delivery of learning materials has received much attention in the South African media, and the DBE plans. But – as we have seen from UVS – delivery (measured here by uptake of the UVS service), is only the first step in a logical chain of connected event required for learning. In the m-learning environment 'uptake' establishes that the material has been received; but it falls short of whether the materials are being used, how they are being used, the duration of use and whether or not this use is leading to improved learning outcomes. The same is true of printed workbooks. The delivery of workbooks to schools, does not mean that the workbooks are received by the learners. Receipt of workbooks by learners does not mean that the learners use the workbooks in a meaningful and active way which could lead to improvement in learning outcomes.

Discussion and recommendations

A commonly-shared and documented theory of change between all partners, defined prior to implementation, can help to ensure that all have a common understanding of the intervention.

In the early stages of discussion between UNICEF and the Reach Trust, it was not required to document a theory of change and use a results matrix. When UNICEF introduced these requirements as part of signing PCAs with partner organizations, a theory of change was created. However, this was after the launch of the service and meant that it was 'retro-fitted' to the project. Defining the Theory of Change and Results Matrix up front may have helped to tighten the initial focus of the intervention and ensure that there was common understanding amongst all partners about the expectation and limits of the project.

Although a detailed results matrix was developed, there were weaknesses in the theory of change and related logic model for the UVS. The envisaged theory of change was that

Making available educational resources, and psychosocial services which could be accessed using mobile phones would have a positive 'impact' on secondary schools, which seemed to be broadly agreed to be 'improved learning outcomes'.

This statement could have benefited from being more tightly defined, for example, defining specific ages/grades, particular academic subjects and/or specific psychosocial support interventions and services. A more detailed theory of change might have considered:

- Who is being targeted (such as Grade 10 learners in quintile 1 schools or a particular district of province);
- What educational resources / services are to be used (such as making use of a Childline telephone number) and how use of the resources/service is expected to change behaviour of the target group;
- How the service will be accessed (by considering target audience access to mobile devices and data);
- How changes in behaviour are envisaged to impact on standardized measures (such as school attendance and/or attainment in Grade 10 Language tests).

The broad theory of change adopted by UVS meant that causal connections between each step in the theory were not sufficiently tightly defined to determine its veracity, while connections between what UVS sought to provide and how improvement in Grade 9 mathematics and literacy ANAs would occur were not sufficiently explicit. Provision of learning materials is of limited value if these are not sufficiently fit-for-purpose and integrated into the human network responsible for educational engagements. Likewise, supplying materials does not, by itself, ensure that learners will access the materials (even if they have the requisite device).

In addition, whilst the varied nature of UVS had the advantage of allowing users opportunities to access a variety of apps supporting various subjects and providing psycho-social support of different kinds, it may have had the unintended consequence of diluting the effectiveness of the intervention. Sustained, focused attention on one or two subject areas may have been more likely to achieve positive outcomes. It may therefore have been better for the service to be more narrowly defined.

As a consequence, the following is recommended for future initiatives:

- 1) A Theory of Change should be developed prior to launch of an intervention, ideally derived through structured planning discussions involving all key role-players. All funding and implementing partners should sign off this the theory of change.
- 2) Projects should have a detailed Logic Model against which the success or otherwise of the intervention can be measured, both internally (by the partners) and externally (by evaluators). This logic model should align with the theory of change, but include clearly defined indicators (against which future achievements can be measured).

- 3) The monitoring and evaluation partners should be bought on board early enough that they can support this clarification phase.

Focus exclusively on the use case for education (not social-media trends).

The overly-ambitious predictions of UVS use that were based on trends in use of Mxit at the time of planning proved to be unduly optimistic. Although the rationale for this was understandable, it does demonstrate how rapidly trends in wider social use of technology change. This illustrates that such short-term trends, which can often be highly volatile (and especially when new innovations are being considered) provide a risky basis for planning rollout of e-learning and m-learning interventions on a large scale.

As a consequence, the following is recommended for future initiatives:

- 4) Given the rapidly evolving nature of the ICT industry, app designs should – to the greatest extent possible – be kept independent of potentially transient trends in technology use in broader society, and should rather

Design for scale, but pilot and invest in gathering user feedback to improve the design

Project design decisions should differentiate clearly between testing new technological innovations and scaling up use of e-learning or m-learning on a systemic scale. While testing of technological innovation remains important, decisions about scaling these up should only be taken once a pilot phase is completed and independent evaluation has verified the potential educational effectiveness of the innovation. Then, strategies to scale up successful innovations should consider the likely long-term sustainability of technological environment on which the innovation is based in ways that do not depend on uncontrollable variables to ensure financial viability.

All m-learning interventions require detailed user testing, monitoring of feedback, and improved designs based on this feedback. There was some evidence of technical errors in the UVS, which were either a consequence of design issues or technical problems in collection of data. This highlights the importance of investing time and resources for testing and refining products before their use is scaled up. Thus, the following is recommended for future initiatives:

- 5) Services should be piloted before being launched, to ensure that all technical bugs are overcome and the service works in a way that users find easy. An ongoing cycle of trial-implement-respond to user feedback should ideally be built into the design cycle.
- 6) Mechanisms to allow feedback from users should be designed into the service. Feedback is key mechanism for educational improvement. If qualitative human feedback is enabled, project partners offering the service will require enough people to engage with the feedback meaningfully.

Invest in processes to drive uptake

The fact that over one million people ‘touched’ the UVS service is a good sign of the visibility of the service. However, the fact that fewer than 20% of these people actually registered on the service suggests that the vast majority of those who touched the service were not sufficiently motivated to go through the registration process. Reasons for this are unclear, but it is likely that some of those touching the service saw no relevance in the service for them, or saw it as relevant but were put off by the need to go through a (fairly lengthy) registration process. Registration required a relatively complex and time-consuming registration process, which may have put off potential users.

Nonetheless, uptake of the UVS can be considered good to very good. Experience with this service showed that marketing and training at specific schools and other institutions did appear to increase uptake at those institutions. Nevertheless, lengthy registration processes pose a barrier to uptake. It would be better to have a light registration process which allows users to explore the application as quickly as possible. After some use, they could be incentivized (for example with airtime) to engage further and provide more personal details.

A key lesson from the UVS is that driving uptake requires large investments in marketing, and integration of the resources into the daily lives of the target audience. Further, once the target audience is registered, ongoing usage of an m-learning service is not guaranteed, but requires continuing marketing, communication, and systemic integration. In addition, usage of a particular service will not necessarily or automatically lead to positive changes in knowledge and practice. Ensuring that an m-learning service leads to positive changes in knowledge and behaviour requires careful planning, tight definition, initial testing, and careful monitoring and evaluation.

In any DBE m-learning and e-learning intervention, TCMs and ELCs are key intermediaries through whom use of the service will spread, since they should be interacting on a regular basis with teachers and others in the field of education, and so are in a perfect position to facilitate buy-in from others and to support their use of the service. However, they need to buy-in themselves first. Several TCMs and ELCs cited financial constraints as their reason for either not registering with the UVS or not using it often. This is surprising as these are all fairly high-level officials in full-time positions whom one would expect would have at least the necessary feature phone and the small amount of money required to access the service.

Many also indicated that they were 'too busy' to register for or use the service. This is a cause for concern, since both TLCs and ELCS have digital technology as a direct and explicit part of their jobs. These explanations suggest that TCMs and ELCs did not buy into the ways in which the UVS could support their job, or into technology in general. For the UVS, TCMs and ELCs received only a one- or two-hour UVS training session, which was repeated a year later. Key intermediaries like these most likely need to be given much more detailed initial training, and ongoing communication/support, with regular follow-up to determine whether they are using and marketing it and, if not, why that is so.

In the UVS, learners, teachers, and parents signed up for the m-learning service through digital advertisements. This was through Mxit, which is not surprising as almost all investments in marketing were Mxit advertisements. More roadshows and/or direct marketing may have been greater uptake. It is somewhat surprising, however, that more people did not sign up for the UVS through the informal 'marketing' of family members, peers, and colleagues.

As a consequence, the following is recommended for future initiatives:

- 7) Metrics for reporting on uptake should be agreed from the outset.
- 8) M-learning interventions require a detailed plan for activation, marketing, communication, and ongoing support to the target beneficiaries and intermediaries. This support may need to include both technical support (to assist with issues like problems accessing the service) and educational support (to make it clear what the benefits of the service are to beneficiaries and intermediaries).
- 9) Registration processes should be streamlined to make it quick and easy to register, especially initially, so that people are not deterred from the process.

Engage with and respond to usage statistics and user feedback, ensuring that usage data is reported and accessible remotely by project partners

This evaluation's reports on usage provide the first opportunity for the UVS project team to reflect on this output. Expected monthly active user data was not generated, nor was it included in the dashboard. Usage was reported occasionally using WhatsApp messages or e-mails, but was not formally tabled as part of project meetings.

Where measurement of learning outcomes is desired, clarify metrics for measuring improved learning outcomes upfront and ensure that assessment tools are in place from the outset to make these measurements. This evaluation was not intended to measure impact of the service (on learning attainment). However, future e-learning and m-learning interventions may possibly wish to ensure that such impact measurement is factored into their design and implementation. As a consequence, the following recommendation might be considered for future initiatives:

As a consequence, the following is recommended for future initiatives:

- 10) Clear metrics for tracking use of e-learning and m-learning services should be agreed up front and incorporated into the design of those services, with analytics tools enabling real-time access to usage data and reports based on those metrics. These analytics should be set up in such a way that data about usage of the service can readily be isolated from usage of any overarching service in which it may be embedded.
- 11) Project management teams ought to monitor uptake and usage on a monthly basis, and devise suitable strategies when there is low uptake.
- 12) Careful consideration should be given to mechanisms to ensure that accurate data relating to the demographics of the users; the schools that they use; and so on can be collected at registration without making the registration process unnecessarily burdensome.
- 13) Programme implementers, intermediaries and beneficiaries at various levels ought to have access to uptake and usage data in real time. As such uptake and usage should be reported via an application backend that is accessible online.
- 14) All uptake and usage data collected should be regularly scrutinized to ensure that data is being collected correctly, particularly when new innovations or services are introduced that might create inaccuracies in data generation and collection.
- 15) If interventions set out to improve learning attainment, then clear, rigorous research designs and metrics for measuring shifts in attainment must be agreed from the outset.

Project monitoring data should be used to effect changes and improve interventions

The UVS incorporated a serious attempt to develop a detailed project framework against which the project could be evaluated. A positive improvement in the project design was to introduce a documented results matrix against which the project progress was reported. The results matrix was introduced as a result of monitoring and reflection processes which were put in place – and was viewed by project partners as a ‘remedial’ intervention to improve the project outcomes. Likewise, tightened, more focussed plans developed over the course of the intervention. There is also clear evidence of project management meetings and record keeping. At these meetings, key role players from all partners attended and were appraised of the latest developments in the UVS.

Building on these positive practices, the following is recommended for future initiatives:

- 16) Once planning documentation has been agreed, both quality assurance processes (monitoring and evaluation activities), and financial management decisions should be aligned to the agreed project framework.
- 17) Mechanisms to deal with non-delivery of agreed activities should be defined in contractual agreements, so that mitigating contractual process can be followed as and when the need arises.

To enable proper analysis of costs and cost-effectiveness of technological innovations during piloting phases, the full actual costs of all partners (including in-kind contributions and time of full-time employees) should be carefully tracked to enable meaningful analysis

Because actual expenditure was not reported and in-kind contributions of all project partners were not tracked from the outset of the UVS, very few meaningful observations about cost effectiveness of the pilot have been possible that can feed into future planning. However, the experiences of the UVS do illustrate the risks of making costing assumptions based on trends over which the project does not have control. The most obvious example of this was the set of assumptions about numbers of MXit users and how advertising to those users would translate into large-scale uptake and use of the UVS. As a consequence, the following is recommended for future initiatives:

- 18) Before developing project budgets that focus on scaling up technological innovations in e-learning or m-learning, a period of piloting is important in which full costs of implementation are carefully tracked so that they can inform decisions on the relative cost-effectiveness of scaling up the innovation.
- 19) To the greatest extent possible, and particularly in a context where a project is based on partnerships between the public and private sector, the period of project piloting should focus on measuring actual costs incurred rather than fees typically charged in a commercial setting, as the latter can have a distorting effect when considering long-term cost effectiveness. For example, knowing the actual cost drivers behind an advertising fee charged per learner would help to determine whether or not the resultant conversion rate into use of the UVS reflected sufficient value for money to continue with that marketing strategy or rather divert those funds into alternative marketing strategies.
- 20) Linked to the above, project management process should, to the greatest extent possible, enable regular review of project spending in order to provide a basis for future project and financial planning. Ideally, project management structures should be sufficiently flexible to ensure that monitoring data and formative evaluative inputs can enable shifts where appropriate in spending. For example, given the low conversion of MXit advertisements into use of the UVS compared to the apparent effectiveness of in-school engagement, re-direction of spending may have yielded more productive results. This flexibility is especially important during piloting phases of technological innovations, given the inherent uncertainty of what strategies are most likely to work successfully.
- 21) Where project partners are offering services that are non-core (for example, conducting surveys) these aspects of project implementation should be subject to normal procurement rules of agencies like UNICEF to ensure that financial comparisons between the services of different firms can be considered.
- 22) Ideally, budgets should be zero-based and derived from project activities rather than including line items for full-time staff. Such budgets make it easier to link resources (for example, time-on-task) to specific deliverables, thereby aligning the level of effort required to achievement of expected project results. Such budgeting approaches might draw on the activity-based budgeting approach that UNICEF has already introduced into its project approval process.

Conclusion

The UVS is one of the few e-education interventions which has undertaken an evaluation which is intended to guide future investments and share lessons with a wider audience. Detailed lessons relating to particular components of m-learning have been outlined above. As can be seen from this evaluation report, the UVS has provided a tremendously fertile environment for learning important lessons about m-learning at a time when the concept was relatively new and very little was known globally about what the most effective strategies for harnessing mobile technologies in public schooling systems might be. Consequently, the project provided an excellent space for this experimentation, evidence of which is provided in the many lessons that have been learned and documented in this evaluation report. From this perspective, even the challenges and problems documented above can be considered a sign of success, as they provide excellent lessons for future planning of e-learning and m-learning initiatives.

Technology and m-learning has an important place in modern education, but is not a panacea for all the problems within the discipline. As McGowan (2015) says, 'The simple truth is that technology-supported education can be used to distribute and deliver really good education OR really mundane education. Using computers and the internet is not an educational silver bullet, but it could be a remarkable educational tool' (p. 293). The same holds true for m-learning which is relative new in the field of technology enhanced learning. Thus, it is essential for decision makers to plan very carefully (and then monitor and evaluate) how any technology and related resources (such as mobile content and/or printed textbooks and workbooks) will be used and integrated into the different levels of the education system in ways that lead to changes in knowledge and practice by the targeted audience (and within the tightly defined scope of work).

There are three possible ways forward for the UVS:

- 1) **More-of-the-same:** continue with the current (Mxit) platform, applications and partnership relationship. The Reach Trust has provided a scope and budget for this.
- 2) **Tweaking the UVS:** remove the service from its current platform (Mxit) and host it on an alternative platform which is likely to have more longevity than Mxit. The current applications could be carried through to this new platform, and the bespoke applications indicated in the original plan but only currently developed to a beta version by the Reach Trust could be developed to the final version. It is theoretically possible to give indicative costings for developing these to finality, but as they would be highly speculative it is unwise.
- 3) **Revisit the conceptual phase and redefine the needs:** based on an assumption that a complete overhaul is needed rather than just a revamp of the current version, in order to take into account lessons learned to date. A new scoping and theory of change process would need to be completed, in order to re-visit the purpose of the intervention in its entirety.

Given the issues outlined in this report (and most particularly the radically changing use patterns of Mxit and the lessons that were learned about user preferences, marketing and usage patterns, and so on), it seems most sensible to pursue option three, so that any future design is informed, from first principles, by the lessons learned by the UVS. Given that the technological environment in South Africa continues to transform very rapidly, it seems appropriate to commence future planning with re-development of a new Theory of Change that draw on the lessons documented in this report. Once this is complete, it may be that there is merit in continuing with 'more-of-the-same' or 'tweaking the UVS' or that project partners (and particularly the DBE and UNICEF as the lead educational partners) identify a requirement for a more comprehensive overhaul. This can only be determined through a systematic and structured planning process that builds on the lessons of the UVS.

We trust that this evaluation contributes to learning about how to harness the potential of technologies in the education system. Any critique of the UVS in this evaluation has been delivered not because the authors believe that m-learning is of no value in modern education; on the contrary, it is a critical component. Rather, for m-learning services to be successfully implemented and impactful, they need to be better conceptualized and managed than was the case with the service under evaluation.

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ADDENDUM A: DOCUMENT REVIEW SOURCES

Table 35 *List of sources for the document review (February 2016)*

Type of document	List of documents received (February 2016)
Context documents defining the policy and strategic context	<ul style="list-style-type: none"> • UNICEF (n.d.) <i>East and Southern Africa Region (ESAR) Innovation Strategy 2015-16</i> (UNICEF regional strategy on innovation) • UN (2015) <i>Sustainable Development Goals are set and welcomed</i> • UN Open Working Group (2015) <i>Sustainable Development Goals and Targets</i> • United Nations (2000) <i>Millennium Development Goals</i> • Department of Education (2004) <i>E-education White paper</i> • National Planning Commission (2012) <i>Improving Education, Training and Innovation. In National Development Plan 2030</i> • National Planning Commission (2011) <i>Diagnostic Report</i> • Department of Education (2006) <i>National Policy Framework for Teacher Education and Development in South Africa</i> • Department of Basic Education and Department of Higher Education (2011) <i>Integrated Strategic Planning Framework for Teacher Education in South Africa 2011-2025</i> • Department of Basic Education (2010) <i>Action Plan 2025</i> • Department of Basic Education (2014) <i>National Strategy for Learner Attainment 2015</i> • Department of Basic Education (2015) <i>Five year strategic plan: 2015 – 2025</i> • Department of Basic Education (2015) <i>Action Plan to 2019: Towards realization of Schooling 2030</i> • UNESCO (2013) <i>Policy guidelines for mobile learning</i> • UNESCO (2015) <i>Qingdao declaration on ICT and post-2015 education</i> • UNICEF (2009) <i>Manual: Child Friendly Schools</i> • Department of Basic Education (2007) <i>Guidelines on ICT and development</i>
Internal initial planning documents	<ul style="list-style-type: none"> • Mxit Reach (n.d.) <i>An introduction to Mxit Reach</i> (PowerPoint presentation) • Author unknown (n.d.) <i>Developing and Implementing a Mobile Teaching and Learning Support System for the Department of Basic Education. The broad concept and context.</i> • Author unknown (n.d.) <i>Proposal: UNICEF Virtual classroom</i>
Internal project planning documents and reports on implementation	<ul style="list-style-type: none"> • UkuFUNda (n.d.) <i>Objectives</i> (an untitled 3-page document on the ukuFUNda objectives and indicators) • UkuFUNda (n.d.) <i>Annex E: Workplan 2013</i> • UkuFUNda (various dates) <i>ukuFUNda project meeting minutes</i>: 15 October 2014; 3 Dec 2014; 17 February 2015; 16 March 2015. Note: Are there minutes for meetings prior to Oct 2014? • UkuFUNda (various dates) <i>ukuFUNda project reports</i>: Sept 2013; March 2014; June 2014; Sept 2014; Dec 2014; March 2015 Note: Is there a report for Dec 2013? • Department of Basic Education (various dates) <i>Quarterly presentations and occasional reports to the CEM (Council of Ed Ministers)</i> Note: These are still to be obtained from Kulula
Financial reports and documentation	<ul style="list-style-type: none"> • Rudge, A. (2013, March). <i>Budget: ukuFUNda virtual school programme on Mxit 2013/14</i> • Rudge, A. (2013, March). <i>Funding authorisation and certificate of expenditures</i> • Rudge, A. (2013, September). <i>Funding authorisation and certificate of expenditures</i> • Rudge, A. (2015, March). <i>Funding authorisation and certificate of expenditures</i> Note: are there any similar FACE forms for the period between Sept 2013 and March 2015?
<p>Note: Documents which show actual expenditure, against the budget, are still required. Further financial information will be requested from Rory Williams (UNICEF Finance Specialist)</p>	

ADDENDUM B: GENERIC AGREEMENT BETWEEN MXIT AND THIRD PARTY CONTENT PROVIDERS



CONTENT AGREEMENT

between

Mxit Lifestyle (Pty) Ltd: Reg. No. 2004/004890/07 ("Mxit" or "We")

La Gratitude Building, 97 Dorp St, Stellenbosch 7600 RSA

P O Box 12302, Die Boord Stellenbosch

Tel: +27 21 888 7000; Fax: +27 21 882 9239; Email: sales@mxit.com

And

Agreement #: _____

Client Name:

("Content supplier" or "You")

Reg no.: _____

VAT No.: _____

Primary Contact: _____

Billing Contact: _____

Designation: _____

Physical Address: _____

Billing Address: _____

Post Code: _____

Post Code: _____

Phone no.: _____

Phone: _____

Fax no.: _____

Fax No: _____

Email: _____

Email: _____

Territory: _____

Currency: _____

Content Terms and Conditions

Introduction

- 1 Please read these content terms and conditions in association with the Content Policy (<http://site.mxit.com/pages/policies>). By signing this agreement you are bound by the conditions set out in the content policy.
- 2 By using the Content Store site and registering as a content supplier, you represent and warrant that you are over the age of 18 and are lawfully able to accept these Mxit Terms. If you are registering as an content supplier on behalf of any entity, you further represent and warrant that you are authorised to accept these Mxit Terms on such

entity's behalf, and that such entity agrees to indemnify Mxit for violations of these Mxit Terms.

Appointment

3 You will provide the content and Mxit (we, us, our) will see to it that our users can download or purchase your content on the Mxit platform through our Native Mxit Content Store. We agree to provide the Content Store Site (CSS) in the manner described in this agreement.

4 Your appointment gives Mxit the right to grant you access to the CSS to enable you to load your content.

5 This agreement will continue indefinitely and can be cancelled by either party giving one (1) calendar month notice.

6 We may at any time display content from your competitors and place your content in close proximity to that of your competitors.

7 This agreement covers any of your content sold through the Native Mxit Content Store or other default content areas that we may develop from time to time.

8 Where you choose to sell your content through your own application using our APIs you are required to adhere to the Mxit API terms:-

Content

9 Your content should comply with our Content Policy, our technical requirements and our Privacy Policy (current versions are available on <http://site.mxit.com/pages/policies>). We may delay publishing any or all content uploaded by you into the CSS if said does not comply with any of these policies or requirements.

10 Your content will be subject to a final review and approval prior to it being published in the Native Mxit Content Store.

11 Mxit retains the right to expire content items based on time hosted in the content store and/or the number of units sold. Mxit's decision to remove content will be made at its sole discretion and will be final.

12 Mxit may request that a minimum amount of new content be loaded within a specified timeframe to ensure that the Native Mxit Content Store remains relevant and up to date. Failure to comply may lead to this agreement being cancelled and any content relating to this agreement being unpublished.

13 Mxit may also impose a maximum limit on the number of content items that you may load in CSS at any point in time.

14 You are responsible for controlling access to your account on the CSS.

Revenue share

15 We pay you 40% of the net shareable revenue generated from the sale of the content you load. When we calculate the net shareable revenue we deduct network operator fees, 'money-in' costs and taxes from the gross revenue (sometimes referred to as the EUP), while you agree to settle all royalties and payments to rights holders from your 40%.

16 You will be paid on the same terms as those contained in our API terms. (<http://site.mxit.com/pages/policies>).

17 Mxit will retain the right to monetise the Native Mxit Content Store through advertising and will retain 100% of revenue generated through advertising served in the Native Mxit Content Store.

18 For us to correctly identify you, you will always include your unique contract code in your communications with us.

Advertising and promotion of your content

19 If you promote the Native Mxit Content Store in the media, we must first approve the promotional material. You agree not to create an impression that you are affiliated to us or that we endorse your content.

20 Unless we have agreed explicitly otherwise, we may sometimes, at our sole discretion, promote your content on our platform.

Intellectual property rights

21 Each of us remains the owner of our intellectual property rights as well as all intellectual property rights created during the course of this agreement. Nothing in this agreement may be taken to mean that we have given you the right to use our intellectual property rights outside the scope of this agreement.

22 Each party shall not disclose or use the other party's confidential information.

Liability, indemnity and suspension of services

23 You warrant that you own the content or may use it for the purposes described in this agreement, it complies with the law, it is free from malicious code, and you have all approvals, licenses and/or permits necessary to display the content and to conduct the activities promoted by the content. You indemnify us against any claims or damages, including legal costs, which may result from your breach of these warranties.

24 Our services are provided 'as is' and we do not give you any express or implied warranty in respect of our services. We are not liable for any damages or losses you may suffer. Although we do our best to ensure our statistics are as accurate as possible we cannot, because of our reliance on third party networks, warrant the accuracy of our statistics.

25 We may suspend our services for a reasonable time to upgrade or maintain our systems. We may do so without giving you prior notice or compensation.

26 You have no claim against us if we cannot render our services because of circumstances outside of our control.

27 If you are in breach of this agreement, we may either claim immediate specific performance for serious breaches, or within 3 working days for non-critical breaches. In the case of malicious breaches or breaches that threaten our reputation, we reserve the right to cancel this agreement with immediate effect. We reserve the right to suspend our services if you are in breach of this agreement or if you fail to pay any amount when it is due, either to us or to third party rights owners.

General

28 You agree to comply with all applicable laws, in particular with privacy and data protection laws.

29 If we give you any leniency, such leniency will not be an amendment of this agreement. This agreement is fully described in these Content Terms and Conditions, complete with the cover page.

30 The address and contact details you have given us on the cover page of this agreement is your chosen address for legal notices.

31 South African law applies to this agreement and you accept that the agreement is concluded in Stellenbosch.

ADDENDUM C: THE UKUFUNDA VIRTUAL SCHOOL M&E FRAMEWORK

Table 36 *Monitoring and evaluation framework for ukuFUNda virtual school (c. July 2014)*

Objectives	Objectively Verifiable Indicators (OVIs)	Means of verification	Results/ Outputs	Risks and assumptions
Provide learners and teachers with quality education tools on an easily accessible and low-cost mobile platform.	Availability of learning material and virtual school on Mxit by agreed-on launch date.	Random mobile-based check on launch date and any subsequent date. (Availability can be verified from any Mxit-enabled mobile phone)	Create a Virtual School within Mxit Reach environment that includes apps that cover curriculum-based material (such as textbooks) as well as supplementary learning material and interactive exam-preparation exercises.	As a platform, Mxit remains reliant on app publishers to provide high-quality content. We will seek partners in areas where we would like to see improved subject-coverage. (We already have sufficient apps for a virtual school serving Gr 10-12)
Promote learner awareness and use of virtual school through mobile campaign and integration with existing UNICEF education projects.	Number of active users utilizing site, particularly during run-up to exams periods.	Regular (monthly) usage reports compiled from Mxit data. Reports will include the following details: <ul style="list-style-type: none"> • Number of unique Users • Basic demographics such as age, gender, and geographic location. • Most popular education portals in the virtual school. 	Engaged learner community that actively accesses Virtual School.	Access to virtual school will be limited in areas with very poor (or no) cellphone reception. While data costs on Mxit are very low, the individual learners will have to have some airtime available to cover the data cost of accessing the virtual school. Although if they use Cell C the data charge is currently zero.
Facilitate easy communication between learners, teachers and parents in order to promote a stable social environment for the learners, and to ensure all parties are focused toward education and assisting the learner in their educational development.	Number of active users (learners, teachers and parents) utilizing the communication features of the Virtual School.	Regular (monthly) usage reports compiled from Mxit data. Reports will include basic demographic and geographic info as listed above.	Create discrete class-based peer-to-peer chatrooms within the Virtual School, as well as communication portals where parents and teachers can communicate with each other.	Resistance to using mobile social networks may impact the speed of uptake of communication features of Virtual School among adults (teachers and parents).

Objectives	Objectively Verifiable Indicators (OVIs)	Means of verification	Results/ Outputs	Risks and assumptions
<p>Expand impact of existing Safety in Schools projects such as Girl Boy Education Movement (GBEM) and Safe and Caring Child-Friendly Schools (SCCFS) by creating virtual presence for the initiatives in the form of portals within the Virtual School.</p>	<p>Number of registered users of the GBEM and SCCFS portals in the Virtual School.</p>	<p>Regular (monthly) usage reports compiled from Mxit data. Reports will include basic demographic and geographic info as listed above</p>	<p>Virtual mobile presence for GBEM and SCCFS initiatives and ability to target all Virtual School users for awareness and activation campaigns.</p>	<p>Mxit will assist initiative organisers in the setting up of the mobile portals, but a level of ongoing monitoring and maintenance will be required (similar to that required by a website).</p>
<p>Gain improved understanding of education landscape in South Africa - including areas of excellence and possible targets for intervention.</p>	<p>Insights reports generated every 6 months after thorough analysis of data generated by user activity in the Virtual School.</p>		<p>Over a period of time (from 1 year onwards), Education Insight Reports will also reflect emerging trends - such as which school districts show an improved performance in exam-prep tests.</p>	

ADDENDUM D: THE UKUFUNDA VIRTUAL SCHOOL RESULTS MATRIX

Table 37 UVS Results matrix

Type of result	Result	Indicator	Baseline	Target	Means of verification	Timeframe	Assumptions	Responsible
Project expected outcome 1	Improved quality of teaching and learning	Performance rates for grade 9 numeracy and literacy	Baseline is 2013 ANA scores.	2% improvement Year on Year in Grade 9 ANA tests	Review of DBE ANA test scores	end of 2017	<p>DBE tests are an accurate measure of learner and teacher performance.</p> <p>That all learners, teachers and parents have access to a mobile mobile subscription, have registered for the platform and utilise it often.</p> <p>That the platform is stable, user-friendly and functional.</p> <p>That teachers utilise UkuFUNda often and have received the required training.</p>	<p>All parties</p> <p>Reach</p> <p>DBE</p>

Type of result	Result	Indicator	Baseline	Target	Means of verification	Timeframe	Assumptions	Responsible
Output 1.1	A virtual school mobile application that provides learners, teachers and parents with quality educational tools is developed and deployed	UkuFUNda virtual school	No previous virtual schools existed prior to UkuFUNda development	Existence of UkuFUNda virtual school	A mobile phone-based platform	November 2013; Launched Sep 2014 Operational 2015-2017	It is technically possible to build UkuFUNda	Reach and DBE
Activity 1.1.1	Design of the Virtual School. This includes the conceptual design, and then identification of the specific components of the virtual school (e.g. which applications to include, what is the user journey, how is data stored at a user level.	Wireframes required for the build of a virtual school	No previous virtual schools existed prior to UkuFUNda	Well-structured registration process, map dashboard and navigation.	Wireframe document	Mar 2013- Jun 2013	Wireframe is the appropriate methodology for design work.	Reach
Activity 1.1.2.1	Development of UkuFUNda based on the specifications identified above.	Live version of UkuFUNda accessible on a broad range of devices, such as Nokia, Android, iPhone and Blackberry	Zero baseline	Live version of UkuFUNda with agreed number of applications.	Software code	Jun 2013 to Sept 2014	Reach has adequate development resources	Reach and DBE

Type of result	Result	Indicator	Baseline	Target	Means of verification	Timeframe	Assumptions	Responsible
1.1.1.2.2	Development of communication apps for teachers and learners that improves communication between different groups and enhances learning and teaching.	A number of communication tools created: My Calendar, My Message, My Classroom, My Wellness and Safety (including a career guidance app) and My Groups	Zero	All communication tools listed under indicator to be available from Sep 14 onwards and being utilized by learners and teachers via the UkuFUNda application.	Learners and Teachers accessing communication tools on a regular basis (minimum once per month)	Nov 2013- Sep 2014	That the message/notification database is comprehensive and that there are no technical issues with sending messages/notifications	Reach and DBE DBE
1.1.1.2.3	Content for messaging via My Calendar, My Groups (learning communities for educators)	1 x content database for each user group, timed to key dates in the DBE and UNICEF f calendars Number of messages / notifications	No message database	Content database- An average of one messages per week sent to learners, educators and parents	Content database Messages/Notifications	15 Jan 2015	That the message/notification database is comprehensive and that there are no technical issues with sending messages/notifications	DBE and UNICEF
1.1.1.2.4	Aggregation of all existing counselling support services into one app, My Wellness and Safety	1 x My Wellness and Safety app with relevant support services	Zero	Availability of My Safety and Wellness application to Teachers and Learners	Existence of my Safety and Wellness application	Sep 2014	That all existing applications can be aggregated within the new application.	Reach
1.1.1.2.5	Upload Content for CSTL section on UkuFUNda	CSTL content on UkuFUNda	NO CSTL content in the app	A CSTL app is developed on UkuFUNda	CSTL app is live on UkuFUNda	Launch February 2015	Content from DBE and UNICEF is in digital format and can be easily incorporated into UkuFUNda platform and is provided by Jan 2015	Reach

Type of result	Result	Indicator	Baseline	Target	Means of verification	Timeframe	Assumptions	Responsible
Activity 1.1.2.6	Development of parents section on UkuFUNda	UkuFUNda Parents Application	Zero	Parents App accessible via UkuFUNda	Existence of Parents App	Launch February 2015	Existing MyCalendar functionality and MyMessages can be used for the Parent App Content for calendar and messages is supplied by DBE	Reach DBE
Activity 1.1.2.7	Development of Self Diagnostic Tool for Teachers	Self Diagnostic Tool application	Zero	Self diagnostic tool accessible via UkuFUNda	Live version available	Launch March 2015	That content is received by 15 December	DBE
Activity 1.1.3	Testing on various mobile handsets and with selected groups of users.	Test environment created, with UkuFUNda in beta allowing identified users to try out UkuFUNda in a testing environment.	Zero baseline	All bugs identified	Live and stable working version of UkuFUNda	Jun 2013 to Sept 2014	That testing environment is a good indicator of real environment	Reach
Activity 1.1.4	Deploy UkuFUNda virtual school	1 x UkuFUNda virtual school	Baseline is zero as no previous virtual schools existed prior to UkuFUNda	1 x mobile phone based virtual school	National launch of UkuFUNda teacher and UkuFUNda learner	12 Sep launch	That the apps have been tested, published and are available for download by targeted stakeholder groups	Reach

Type of result	Result	Indicator	Baseline	Target	Means of verification	Time-frame	Assumptions	Responsible
Output 1.2	Educators, learners and parents use virtual school	Number of learners, parents and educators using UkuFUNda	Zero	2015 target is 40,000 learners and 450,000 teachers (approximately 10% of the target population) and 40,000 parents 2016: 100,000 teachers and 1 million learners and 100,000 parents 2017: 200,000 teachers and 2 million learners and 200,000 parents	Monthly User Active data generated from the UkuFUNda system	Ongoing, measured monthly	That via media, on-platform campaigns and activations in schools, we will reach all stakeholders	DBE, UNICEF and REACH
Activity 1.2.1	Promote UkuFUNda awareness in the media	# of articles, radio slots and tv interviews	Media coverage post launch event (12 September)	Monthly: 1 x article 1 x radio interview 1 x tv mention	A/E of coverage	Reported Quarterly, based on monthly activity	That there are different newsworthy angles to push to media	Reach / UNICEF / DBE
1.2.2	Platform awareness of UkuFUNda via notifications, banners, splash ad campaigns	# of splashes, notifications sent to users CTR of splashes and banners	Zero, as we didn't have a database for UkuFUNda to push notifications and banners	weekly notifications and monthly splash campaign timed to school calendar and events End of 2015: 50 000 teachers and 450 000 learners utilising UkuFUNda every month	Delivery of banners, notifications to users phones	On-going	That there are no technical issues that can impact on-platform media delivery and that all UkuFUNda users log in every day to access notifications	Reach

Type of result	Result	Indicator	Baseline	Target	Means of verification	Time-frame	Assumptions	Responsible
1.2.3	Activations (in-school and public spaces) and provincial training sessions	# of in-school activations # of public space activations #Provincial training sessions (educators)	Zero, as we didn't host in-school and public space activations nor provincial training sessions	Initial provinces are Eastern Cape and Limpopo. The target is to activate 1,000 schools in 12 months. At each school around 10 learners and teachers will be identified who will act as "super-users" they will receive specific training so that they are able to provide additional support to their peers. Collaboration with NECT to ensure that UkuFUNda reaches the specific schools they have targeted for focused interventions. In parallel with the in-school campaign there will be an awareness campaign using key media partners (SABC TV and Radio, Newsprint)	A record will be maintained of all in-school activations. Photographic, film and on-platform feedback. Increase in registration numbers	Jan 2015 ongoing	Funding for roll-out of activations and training sessions. That there are no legal, natural or other challenges to rolling out the activations as planned. That schools are selected and targeted That teacher training sessions are held	UNICEF, DBE DBE DBE
1.2.4	Presentations to SGB, Trade Union and Provincial DOEs	# of presentations	Zero	Quarterly briefings to learners In 2015 target is to reach 40,000 teachers and 450,000 learners	Record of external presentations to governing bodies All TCMs have registered on UkuFUNda	Ongoing to 2019	That SGB's are receptive to allowing UkuFUNda to be presented at meetings	Reach, DBE
1.2.5	Teacher Development Centre Managers	# of presentations to teacher centre managers	Zero	All Teacher Centre Managers are aware of UkuFUNda	All TCMs have registered on UkuFUNda	2015	TCMs are receptive to UkuFUNda	Reach, DBE

Type of result	Result	Indicator	Baseline	Target	Means of verification	Timeframe	Assumptions	Responsible
Output 1.3	UkuFUNda is utilized for collecting and dissemination of strategic information.	Dashboard and survey information accessible to stakeholders	Zero	Dashboard to be operational by Feb 2015	Dashboard accessible via web interface	Feb 2015	Stakeholders agree on data to be captured from system	Reach, UNICEF, DBE
Activity 1.3.1.1	Conceptualise dashboard and data requirements	Concept document that guides the design and development	Zero baseline	Document recording key data requirements	Stakeholder agreement on data for dashboard	Dec 2014	Stakeholders agree on data to be captured from system	Reach / UNICEF / DBE
Activity 1.3.1.2	Design	Wireframes for dashboard	Zero baseline	Wireframe design	Signed off wireframe design	mid Jan 2015	Wireframe can translate into dashboard design	Reach
Activity 1.3.1.3	Web interface development	1 x Dashboard website	Zero baseline	Dashboard live and available to stakeholders	Software code	End Feb 2015	UkuFUNda backend feeds into dashboard	Reach
Activity 1.3.1.4	Testing	Live website providing access to key data	Zero baseline	Website signed off by Q&A testers	Q&A report	March 2015	Testing is a good indicator of live environment	Reach
Activity 1.3.1.5	Deployment of dashboard	1 x web-based dashboard	Zero baseline	Dashboard utilized by Stakeholders to inform decision making	Live dashboard	End Mar 2015 onwards	DBE allows dashboard weblink accessibility for key-staff	Reach DBE / UNICEF
Activity 1.3.2.1	Learner Happiness Index Learner Happiness Index Wave 2 Learner Happiness Index Wave 3	Survey deployed on UkuFUNda	Existing baseline from first Learner Happiness Index	Minimum quarterly surveys assessing teacher and learner happiness	Data from survey as well as narrative	Ongoing	Questions used to determine Learner Happiness Index are an accurate means of assessing happiness	Pondering Panda / DBE
Activity 1.3.2.2	Ad hoc surveys	Minimum 1 Survey per quarter deployed on UkuFUNda	Zero baseline	Surveys to be conducted on an ad-hoc basis but minimum 1 per quarter	Data from survey as well as narrative report	Ongoing	UNICEF / DBE provide content for survey	UNICEF / DBE
Activity 1.3.3	Conferences	# of presentations delivered	Zero baseline	Two presentations per semester	Record of external engagements by Reach / DBE / UNICEF Staff where UkuFUNda is presented.	Ongoing	There are conferences worthwhile attending and presenting at and that we are able to/ invited to present.	Reach / UNICEF / DBE

ADDENDUM E: 21ST CENTURY SKILLS

21st century skills have gained currency in e-education frameworks and education debates this century. Proponents argue that ‘a new workforce reality that demands a next generation of college students and workers who are independent thinkers, problem solvers, and decision makers’ (Silva, 2009, p. 630). This in turn means that public schools ought not to just teach ‘the basics’ but also ‘a suite of newly important thinking and reasoning skills’ (*ibid.*). The essence of these skills is ‘an emphasis on what students can do with knowledge, rather than what units of knowledge they have’ (Silva, 2009) with a focus on ‘complex thinking, learning, and communication skills, and all are more demanding to teach and learn than rote skills’ (Saavedra & Opfer, 2012). Critics argue that these are not new skills and represent a distraction away from teaching core content; which will “water down standards and weaken teaching”, and that “these types of higher-order skills cannot be measured in reliable, cost-effective, or scalable ways” (Silva *op cit.* p.630)

There are a plethora of descriptions of the 21st century skills. Wagner (2014) defined seven 21st century skills: (1) Critical thinking and problem solving; (2) collaboration and leadership; (3) agility and adaptability; (4) initiative and entrepreneurialism; (5) effective oral and written communication; (6) accessing and analyzing information; and (7) curiosity and imagination. Silva (2009) refers to life skills, workforce skills, interpersonal skills, applied skills, technology literacy and non-cognitive skills. Bellotti, Bottino, Fernández-Manjón and Nadolski (2014) refer to “transferable, transversal skills that can be applied in different contexts dealing with various scientific disciplines and subjects” (p. 1). Examples of such skills include persistence towards goal achievement; motivation; engagement; problem solving; systems-thinking and collaboration.

A fundamental shift in educational thinking has been from the assumption that reasoning and analytical skills been seen as higher order skills which can only be developed after a certain age, and after certain conceptual knowledge is secure; to an assumption that that learning factual knowledge and the ability to apply, analyze, and create new knowledge go hand-in-hand and can be developed from any age; and in relation to any concept.

We offer the following as a consolidated list of the kinds of skills referred to as 21st century learning, noting that our compilation has be inclusive and that many of these skills are transferrable, transversal and not necessarily ‘new’ or time-bound to this century:

- Critical and creative thinking;
- Problem solving including system thinking;
- Collaboration and leadership including inter-personal skills and decision taking;
- Agility, adaptability, resilience;
- Initiative and entrepreneurialism;
- Communication (both oral and written);
- Technology or digital literacy skills; and
- Motivation; engagement, persistence.

There are now documented implication of these learning skills for approaches to teaching. For example, Gutiérrez (2000) referring to the implications to teaching, of these ‘new’ learning skills makes reference to the need to manage diverse student communities (Gutiérrez, 2000). Saavedra and Opfer (2012) offer the following nine lessons on the implications of 21st century skills on teaching:

- 1) Make it relevant;
- 2) Teach through the disciplines;
- 3) Develop thinking skills;

- 4) Encourage learning transfer;
- 5) Teach students how to learn;
- 6) Address misunderstandings directly;
- 7) Treat teamwork like an outcome;
- 8) Exploit technology to support learning; and
- 9) Foster creativity.

ADDENDUM F: EVALUATION TERMS OF REFERENCE

1. BACKGROUND

Despite significant progress in improving access to education in South Africa over the past 20 years, the quality of education as demonstrated by learning outcomes, especially for the most disadvantaged learners remains sub-optimal. While matric pass rates have improved between 2009 (60.6%) and 2013 (78%) (and declined slightly in 2014 (75.8%)), local and international assessment tests in reading, literacy and numeracy have reported that South African children lack foundational skills. For example, in the 2014 Annual National Assessment (ANA), literacy (56%) and numeracy (56%) levels amongst grade 3 learners remained low, although on an upward trajectory since 2011. Worryingly so, in the same year numeracy levels progressively declined amongst Grade 6 (43%) and 9 (11%) learners respectively. What is more, only 3% of Grade 9 learners in the system achieved a 50% pass mark in mathematics on ANA.

The Department of Basic Education is committed to improving the quality of basic education through, amongst others, strengthening teacher development, improving curriculum coverage, improving access to quality learning and teaching support materials, conducting annual national assessments and implementing an e-learning strategy. This is articulated in the Department's sector plan - *Action Plan to 2014 - Towards the Realisation of Schooling 2025* - now under revision to 2019.

2. JUSTIFICATION

Mobile phone penetration in South Africa is estimated at 123% suggesting that all teachers, education officials, parents, and a substantial number of learners are likely to have access to a mobile phone. This level of access to digital devices represents an opportunity to mobilise their use as potential resources to support teaching and learning.

Against this backdrop, between 2013 and 2015 UNICEF partnered with the Department of Basic Education (DBE) and Mxit Reach to create a mobile platform that can enable teaching and learning. In September 2014, the DBE, together with UNICEF and Mxit Reach launched ukuFUNda (a Zulu word meaning 'learning to grow'), a virtual school that is an innovation in the South African education system. UkuFUNda uses mobile technology to provide access to learning resources and content, counselling and safety services, a central communication and notification hub and many other value-added services and programmes. It currently aggregates existing learning applications onto the platform and will also develop new applications to support teaching and learning (such as exemplars on the standardized Annual National Assessment tests and a self-assessment tool for educators to assessment content knowledge in key subject areas such as mathematics).

UkuFUNda is unique because it allows accessibility and support across 8 000 mobile devices (feature phones as opposed to smart phones), and reaches remote areas where only 2G connectivity is available, thus having strong equity focus. While many past and current mobile phone-based education programmes in South Africa are solely focused on supporting learners directly, ukuFUNda also focuses on the needs of education officials, schools, teachers and parents to improve education.

The project aims to improve the quality of teaching and learning through the following:

- Design and development of a virtual school mobile application on a low cost mobile platform that makes available quality educational tools for learners, teachers and parents;
- Increasing usage of the mobile phone application amongst learners, teachers and parents; and
- Collecting and disseminating strategic information through a dashboard hosted on the platform.

Key activities include:

- Conceptual design and identification of the specific components of the virtual school (e.g. which applications to include, what is the user journey, how is data stored at a user level);
- Developing communication apps for teachers and learners that improves communication between different groups and enhances learning and teaching;
- Developing/adapting content for messaging via My Calendar, My Groups (learning communities for educators);
- Aggregating existing counselling support services into one app - My Wellness and Safety;
- Testing the platform on various mobile handsets and with selected groups of users, followed by deployment;
- Promoting awareness of UkuFUNda in the media and through the platform via notifications, banners and splash ad campaigns;
- Conceptualising the dashboard and data requirements; and
Conducting surveys on the platform.

ukuFUNda is being rolled out in three phases across the country:

Phase 1 focuses on supporting teacher development through aggregation of teacher development resources, setting up of professional learning communities supported by teacher development centres, and setting up of a notification and communication hub amongst teachers and between teachers and learners. Phase 2 focuses on making available learning resources to learners for use primarily outside the classroom to reinforce curriculum delivery and offering text-based counselling and support services.

Phase 3 focuses on increasing the involvement of parents in schools by providing a communication platform between principals, teachers and parents and ensuring that they are notified in a timely manner of important events at the school.

The conceptualisation and implementation of ukuFUNda took place between 2013 and 2015. While the initial focus was on supporting learning wellbeing (2013/4), its scope was broadened to include teacher development and parental support (2014/5) as the project unfolded. During a period of six months of implementation (September 2014 - March 2015), 111 527 learners and 5 256 educators registered on the site.

3. PURPOSE AND OBJECTIVES

3a. There has been considerable stakeholder learning during the conceptualisation and implementation stages of the programme. The **purpose of this formative (implementation) evaluation** is to distil key lessons that can be used to inform future implementation, scale-up and the sustainability of this important education innovation. The scope of the evaluation is to establish the effectiveness, efficiency and sustainability of the ukuFUNda virtual school.

3b. The **objectives of the evaluation** are to:

- Establish if the programme was implemented as planned;
- Verify the reach of the programme amongst learners, educators, parents and officials including teacher centre managers;
- Ascertain what components of the programme are actively being used by learners, educators, parents and officials including teacher centre managers;
- Evaluate the back-end system used to host the virtual school platform and its sustainability; and
- Establish the cost-effectiveness of the virtual school programme and the ongoing sustainability of the proposed model.

The findings of the evaluation will be used by DBE, UNICEF and Mxit Reach to determine the utility of the platform and how to take it to scale.

3c. Scope of the evaluation: The evaluation will assess the process of development, implementation, cost effectiveness and sustainability of the virtual school platform.

3d. Limitations of the evaluation:

As the programme has only been implemented for six months since its launch in September 2014, it will not be possible to ascertain the impact on learner outcomes. The main evaluation criteria that will be assessed are effectiveness, efficiency and sustainability as determined by the objectives of the evaluation.

4. RESEARCH QUESTION

The core evaluation questions that will guide the evaluation are:

- What is the effectiveness of the virtual school programme?
- Is it a cost effective model?
- Is the model Sustainable?

The sub-questions are as follows:

Effectiveness:

- How effective has the planning and implementation of the ukuFUNda virtual school been since its inception?
- Have the planning and implementation objectives been met within the given timeframes?
- Have stakeholders identified in the planning and implementation been reached?
- What are the experiences of target stakeholders with the planning and implementation of the ukuFUNda virtual school?
- What is the current reach (registered and active users) of the virtual school amongst learners, educators, parents and officials including teacher centre managers?
- Are there differences in uptake between males and females?

Efficiency:

- How cost efficient has the planning and implementation of ukuFUNda been?
- Were there adequate resources to implement the programme?
- What does it cost to provide services to learners, teachers, parents and officials?
- Could the same objective of the programme have been achieved with less investment using other similar models?
- What type of costs are anticipated for ongoing maintenance of the platform and ongoing upgrades as access to mobile platforms improve/change (such as to smartphones)?

Relevance:

- How relevant is the concept, planning and implementation of the ukuFUNda virtual school in meeting the DBE's education goals with respect to e-learning?
- How does the ukuFUNda virtual school contribute to UNICEF's priority of using innovation to improve learning outcomes?
- Does the mobile platform offer a relevant solution to promote learning for the 21st century?

Sustainability:

- What would it take to up-scale the programme both from a systems and capacity perspective? What type of systems upgrade would be required to make the platform available on smartphones?

5. RESEARCH METHODOLOGY

Both quantitative and qualitative research methods will be used.

These include:

- a) Review of documents, processes and procedures related to the programme.
- b) Review of the system used to host the ukuFUNda virtual school.
- c) Consultation with the implementing agency (Mxit Reach), DBE and partners working on the virtual school programme.
- d) Interviews and/or online survey with the beneficiaries of the virtual school platform.
The evaluator may propose other data collection methods if appropriate to answer the research questions.

The UNEG Norms and Standards will be followed in this evaluation.

Sources of information:

- a) DBE policy and strategy documents
- b) Programme documents including results matrix
- c) UkuFUNda dashboard that offers disaggregated data
- d) National and provincial departmental officials
- e) Officials from Mxit Reach
- f) Partner organisations of the virtual school programme
- g) The target group of learners, educators, parents and teacher centre managers

6. RESEARCH MANAGEMENT AND SPECIFIC RESPONSIBILITIES

An oversight committee will be formed comprising representatives of the DBE and UNICEF. The role of the oversight committee will be to support the researchers throughout the evaluation process, provide input on the evaluation framework and instruments, facilitate access to the target groups and provide feedback on successive evaluation reports.

The oversight committee will be led by the Evaluation Team Leader with whom the evaluators will liaise directly on all matters related to the evaluation process. The Evaluation Team Leader will also guide and direct the evaluation research team as required. The oversight committee will meet monthly or bimonthly depending on the need.

7. ETHICAL CONSIDERATIONS

The evaluation will follow UNICEF guidelines on the ethical participation of children and other respondents. In addition, all participants in the study will be fully informed about the nature and purpose of the research and their requested involvement. Only participants who have given their written or verbal consent (documented) will be included in the research. Specific mechanisms for feeding back results of the evaluation to stakeholders will be included in the elaborated methodology.

All the documents, including data collection, entry and analysis tools, and all the data developed or collected for this consultancy are the intellectual property of UNICEF and the Department of Basic Education. The Evaluation team members may not publish or disseminate the Evaluation Report, data collection tools, collected data or any other documents produced from this consultancy without the express written permission of, and acknowledgement of UNICEF and the Department of Basic Education.

8 . REPORTING AND DELIVERABLES

The evaluation is expected to take place over 150 days. The following outputs are expected:

Activity: Inception report with workplan

Timeframe: Within 14 days of signing the contract

Activity: First progress update with research instruments

Timeframe: Within 45 days of signing of the contract

Activity: Subsequent progress updates

Timeframe: To be provided for each of the outputs

Activity: First draft of report with document and systems review

Timeframe: Within 60 days of signing of the contract

Activity: Second draft of the report including interviews and/or surveys

Timeframe: Within 120 of signing of the contract

Activity: Final report and Presentation of Findings and Recommendations

Timeframe: Within 150 days of signing of the contract

Upon completion of the assignment, the service provider shall make internal presentations of the report detailing all relevant findings in line with the assignment to UNICEF, DBE and in other relevant fora at a time and date to be arranged by both parties.

The service provider shall ensure that all documents are language edited prior to the submission of the final drafts.

For the duration of the assignment, the service provider shall provide written and verbal feedback on progress made at times as specified in the project plan and as agreed upon with the task team. The completed documents should be presented as a completed document with an executive summary formulated in the format MS Word for Windows. Two CDs containing the report as well as 2 hard copies must be provided.

A sample final evaluation report structure (sourced from the Global Evaluation Reports Oversight System), which has the following components, will be shared:

Table of Contents

- Acronyms
- Executive Summary (highlighting the main findings, conclusions, recommendations and any overall lessons)
- Background and Programme Description (including the policy, institutional and development context and their influence on programme implementation and results)
- Purpose of Evaluation, Evaluation Objectives and Scope;
- Evaluation Methodology
- Findings and analysis,
- Conclusions,
- Recommendations'
- Lessons learned (1-2 pages);
- Annexes: including the terms of reference, evaluation work-plan and any other relevant documents

A set of PowerPoint slides on the final report must be submitted.

9. PAYMENT SCHEDULE

- 20% of the total fee upon submission of an inception report and detailed work plan;
- 40% of the total fee upon submission of the first draft of the report;
- 40% of the total fee upon submission of the final report.

10. QUALIFICATIONS REQUIRED FOR COMPLETION OF THE ASSIGNMENT

- A team of experts with the relevant experience (a minimum of 5 years' experience) and a proven track record of similar work undertaken in evaluation research design in the education sector;
- knowledge of teacher development and the design and use of ICT and mobile technology in the education sector;
- Technical competence in, and experience with mobile learning technologies;
- Knowledge and working experience with government and the UN system would be an asset;
- Capacity to provide professional advice and technical assistance in government programming at national level;
- Analytical skills, presentation skills, strong writing skills as well as excellent language proficiency; and
- Ability and commitment to work to a tight time frame.

11. CALL FOR PROPOSALS

A proposal in response to the terms of reference must be submitted by 01 September 2015. The proposal must include a workplan with proposed timelines. A full budget breakdown is required reflecting daily rates of researchers, travel and accommodation costs and administrative costs.

Full curriculum vitae of the team outlining relevant experience as well as roles and responsibilities must be included. Three (3) references should be provided as proof of experience and track record.

12.EVALUATION WEIGHTING

60 % technical

40 % financial

100% total

* Only proposals which receive a minimum of 42 points in the technical criteria will be considered further in the evaluation process.

13.CONDITIONS

The contractor will work on its own computer(s) and use its own office resources and materials in the execution of this assignment. The contractor's fee shall be inclusive of all office administrative and travel related costs.

Payment will be effected upon receipt of an invoice to UNICEF, and upon satisfaction of the key deliverables by DBE and UNICEF. Any deliverable submitted and not meeting the specifications must be reworked and resubmitted at no additional cost.

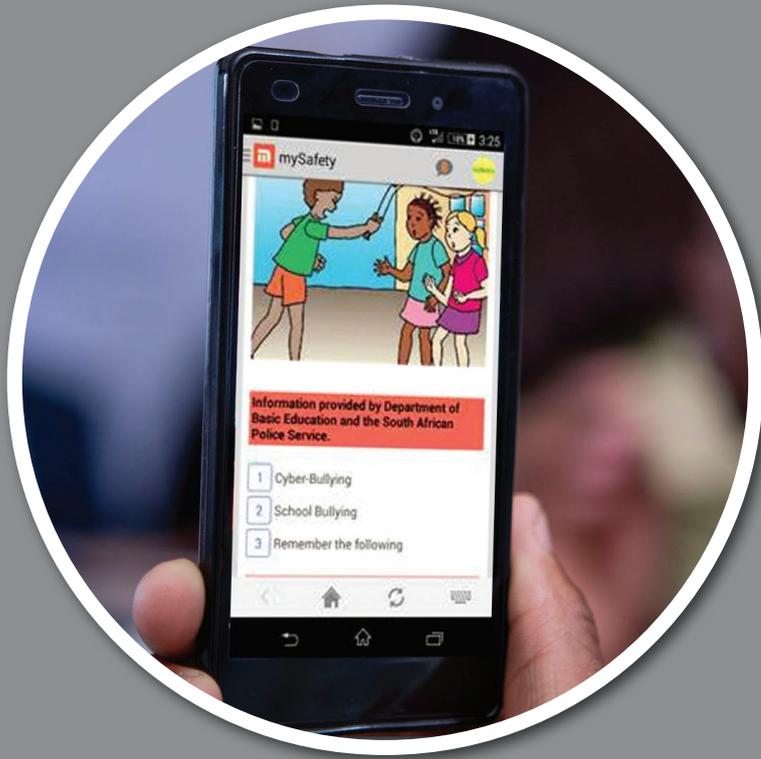
Local travel (outside Gauteng) and airport transfers (where applicable) will be covered in accordance with UNICEF's rules and tariffs.

Flight costs will be covered at economy class rate as per UNICEF policies.

Please also see UNICEF's Standard Terms and Conditions attached.

(FOOTNOTES)

- 1 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p20, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 2 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p20, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 3 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p24, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 4 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p28, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 5 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p28, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 6 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p36, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 7 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p36, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 8 OECD-DAC (2010) *Glossary of Key Terms in Results-Based Management*, p36, <http://www.oecd.org/dac/evaluation/2754804.pdf>
- 9 This session covered downloading of the app; learning how it worked; and motivating them to encourage other officials and teachers to use it (personal communication, Shafika Isaacs, 31 July 2016).
- 10 (Andrew Rudge, personal communication, 24 August 2016)
- 11 The focus in this training was on the additional apps that had been added in the year since the previous training, and the teacher communicator app (which was on Bambisa) (personal communication, Shafika Isaacs, 31 July 2016).
- 12 The psycho-social apps included in ukuFUNda may also be considered to fall under priority areas of the CSTL (Saadhna Panday-Soobrayan, personal communication, 10 August 2016)



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