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Fritz Meissner, Edwin Blake

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Availability4D: Refining the Link between Availability and Adoption in Marginalised Communities

Fritz Meissner[1] and Edwin Blake[1]

[1]Department of Computer Science / Research Centre in ICT4D, University of Cape Town
{fmeissne, edwin}@cs.uct.ac.za

Abstract. We present a comparative study of mobile and conventional computing technologies applied to providing access to career guidance information to high school students from marginalised communities. Reported high availability of mobile technology amongst these users would be beneficial, but our NGO partner questioned feature phones' applicability for consuming large quantities of information. We created two systems: a text interface exposed through a mobile instant messaging service, and a website targeting conventional computers. Despite positive usability tests for the website and fears of social stigma related to mobile instant messaging, system logging over eight months of parallel deployment showed convincing advantage in engagement for the mobile system. Interviews revealed that computer infrastructure was tied to institutions where access was limited; but greater access to mobile phones (owned or borrowed) made use and advertisement to peers of the mobile system easier. Social stigma was a problem only for a minority.
Keywords: availability, adoption, marginalised communities, feature phones, mobile Internet, M4D, NGOs

1 Introduction

In late 2010 we were presented with an opportunity to collaborate with a programme called Link at the Cape Town NGO, The Warehouse [1]. The programme aimed to bolster the support available to high school students in marginalised communities of Cape Town as they made decisions that would affect their later success in the job market. They did this by organising career guidance workshops through church youth groups in the targeted communities.

The Link team (The Warehouse staff who ran the Link programme) wanted us to build a website which would support these workshops by providing students with access to information that would otherwise become stale if only presented in a workshop which ran once every few months. For instance, job openings discussed in a mid-year workshop would likely be filled by the time students were able to act on them at the end of the school year.

adfa, p. 1, 2011.
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Recent research in M4D (Mobile technology for Development) involving fieldwork also performed in Cape Town [2, 3, 4] lead us to believe that it would be beneficial to disseminate this information by some means accessible via feature phones, which had achieved popularity amongst low income youth in Cape Town for accessing entertainment over the mobile Internet, especially mobile instant messaging (IM) services like MXit (a South African service with more than 50 million registered users [5]).

When we first mentioned mobile phones, the Link team shared their awareness of the popularity of the technology amongst youth, and added that its introduction could positively affect negative perceptions of mobile phones (Bosch records perceptions of MXit as time-wasting and harbouring sexual predators [16]):

"It [mobile technology] can penetrate further because you are sending it out to individual locations, and not one central Internet location, so for reach it's better." – Link coordinator

"...it puts a positive spin on why kids should be using cellphones more effectively. Because at the moment there's such a lot of negative press about cellphones... so, if we can get it to be a more positive thing, that's certainly a good selling point." – Link staff member

However their idea of how it could be applied was limited to reminders which would inform students of when to seek out a computer from which to access new content on the website:

"...this is ... the limitation of mobile phones, is how much information can you access, and ultimately ... [you] will need to find an Internet cafe, but at least you'll know whether to actually bother to go and look for one or not, and that was the attraction of adding the mobile aspect." – Link Coordinator

Later in the conversation the Link team mentioned personal experience of problems viewing content on mobile phones, and some misgivings about the cost of airtime to the students. On the other hand, they were familiar with the capacities of the conventional web, and they already had a plan for reaching their audience: church groups who wanted to support teenagers in their communities could invest in the computer and Internet connection necessary for the website, which would also provide opportunity for interaction and mentorship.

Answers to their concerns about mobile technology did exist: text content need not be accompanied by more data hungry (and therefore costly) pictures or video; expertise learned from using popular mobile social networking platforms like MXit could apply for other purposes [6]; the platform had been used for the M4Lit study in which thousands of teenagers read a 21-chapter short story [3] and for the Dr Maths programme [14], which teaches students mathematics; people who learned to surf on mobile phones prefer the "familiar numeric keypad" to a traditional keyboard [4]. From our perspective, then, the technology had already been demonstrated suitable.

However, it would have been unwise for us to take an uncompromising stance on technology. Botes and van Rensburg highlight a "hard-issue bias" amongst researchers as a major cause of developmental project failure, as the debate can become a distraction from other important issues that must be addressed [7]. Proceeding alone was also unwise: we would not be able to make contact with a suitable group of users on our own, and according to Donner et al, M4D projects are more likely to succeed when the mobile technology element is an addition to a pre-existing developmental project [8].

Further, an honest assessment of existing M4D work would require us to raise some caveats: mobile phone use amongst these users is normally associated with entertainment [2]; for the "serious" purposes of school work and research on health topics, computers were more frequently used than mobile phones [2, 3]; in the M4Lit study the number who chose to finish reading the "m-novel" was only a fraction of the number to whom it was advertised (and similar advertising would normally cost a high fee) [3]; and although people are capable of using relatively complex technology to access the content that matters most to them, their priorities might not match ours [9]. Further, a discussion of sustainability concerns would reveal that both M4Lit and Dr Maths had the backing of large research organisations like the Shuttleworth Foundation [10] and the Meraka Institute [11], organisations with far greater resources to dedicate to ICT concerns than The Warehouse could bring to bear on Link. The Warehouse already maintained one website and the Link requirements did not necessitate any change in technology for the new site.

The point was moot: although the Link team were insistent on developing a website for access from conventional computers, they were happy that we follow that up with a mobile effort, and were willing to let us evaluate the two systems with the same users. Having two systems on platforms of differing availability would allow us to investigate the impact of availability on adoption.

2 Research Methodology

2.1 Action Research

The dual goals of development (providing students with a new channel for accessing information from Link) and research (investigating adoption) matched well with the Action Research framework [12]. Our intention to pursue two different solutions, one after the other fit easily into the cyclical approach of the framework, wherein action precedes evaluation and then more action, based on the outcome of the previous evaluation.

Early results in action research projects shape later methodology, but can also prove interesting in the scope of the project as a whole, and so we report separately on formative (earlier work, relating to design, development and refinement of our systems) and summative (later, comparative) cycles.

2.2 Venues

We operated in four different venues, shown in Fig. 1. Lavender Hill (yellow) and Manenberg (green), both designated "coloured" residential areas under racially discriminatory South African apartheid-era legislation [13] were home to church groups with whom Link had been working since before we joined the programme in 2010. The location of The Warehouse NGO, home of the Link programme, is marked by a red pin.

In 2011 the Link programme began a "homework club" at a church in Mowbray (blue). Mowbray, being formerly designated a "white" area was not disadvantaged by apartheid legislation, but the students who attended were isiXhosa speaking residents of informal settlements (shanty towns) not shown on the map which were formerly designated "black" [13]. These students attended a school in the area, and were attracted to the church by flyers advertising weekly help with homework that were given out at a nearby transport hub which they used daily.

2.3 Participants

The beneficiaries whom we interviewed and with whom we tested were either introductions from Lavender Hill and Manenberg church groups, or students whom we tutored (assisting with school work in mathematics and physical science) at the Mowbray homework club. Our interaction with students in Lavender Hill and Manenberg was restricted to two visits each, for user testing of the Link website. At Mowbray, we were able to engage directly for two to three hours weekly for almost two full school years in 2011 and 2012.

At each venue we worked with a subset of all students, either selected by the church groups or by Link, usually based on whether there were other plans for those participants' time on the day that we visited. We therefore did not have control over our samples. Only in the latter stages of the project at the homework club did we have a direct relationship with students that gave us insight about their technology use habits which could help us to select interviewees according to the data we hoped to gather. Even in that case, we were still constrained by which students would arrive for tutoring on a given week, and by a need to balance time as researcher with availability as tutor.

When describing evidence relating to an individual student, we use initials to protect their identity.

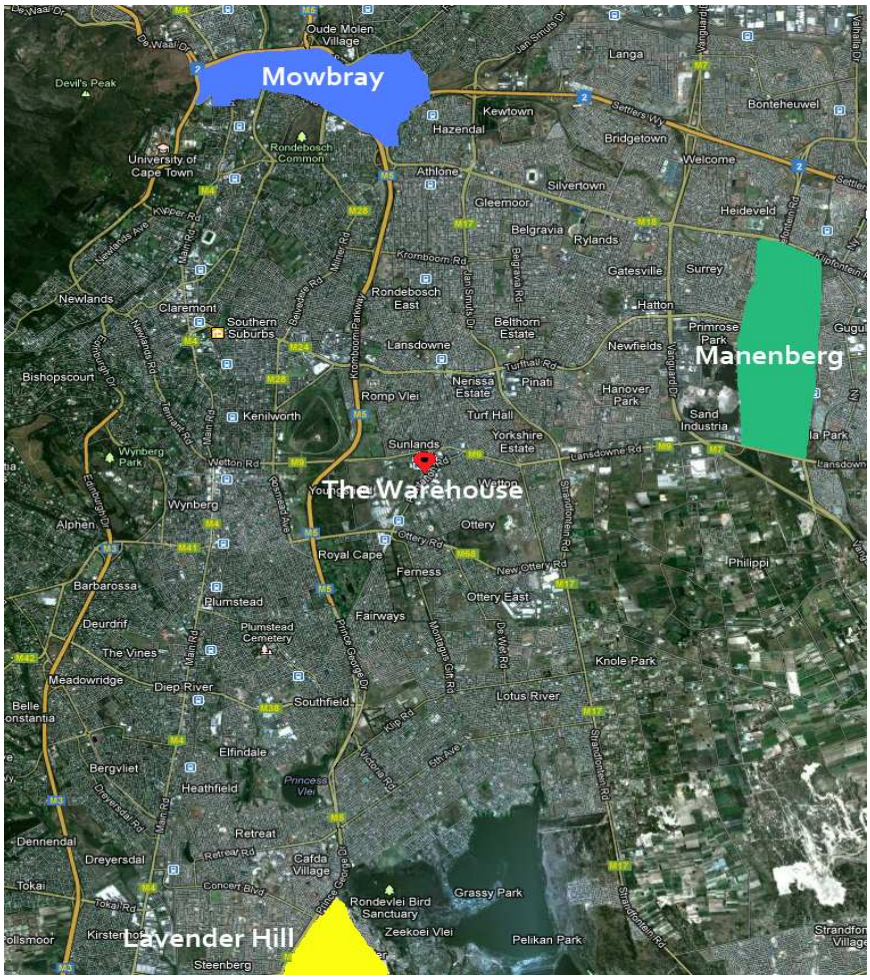

Fig. 1. Map of the southern suburbs of Cape Town, showing the locations in which we worked.

3 Artefact Descriptions

We describe here the two systems that we designed and implemented in order to help the reader follow discussions of user reactions in later sections. The web system is known throughout the paper as the “Link website”, while the mobile system is called “LinkChat”. Information is exposed in the same format in each, as “entries” which are a discrete piece of information such as a job advert or a description of a university course. A single content management system, maintained by the Link team, serves search results and content to both systems.

3.1 Link Website

The website we created allows users to perform full text searches either of the whole site, or restrict themselves to information in one of three categories: study (tertiary courses and bursaries), jobs (job adverts and internships), and skills development (short courses and internships). A fourth section, start a business, was inoperable for the duration of our study. Entry detail pages (see Fig. 2) can be chosen based on their title and the first few lines of description on a search results page similar in appearance to Google.

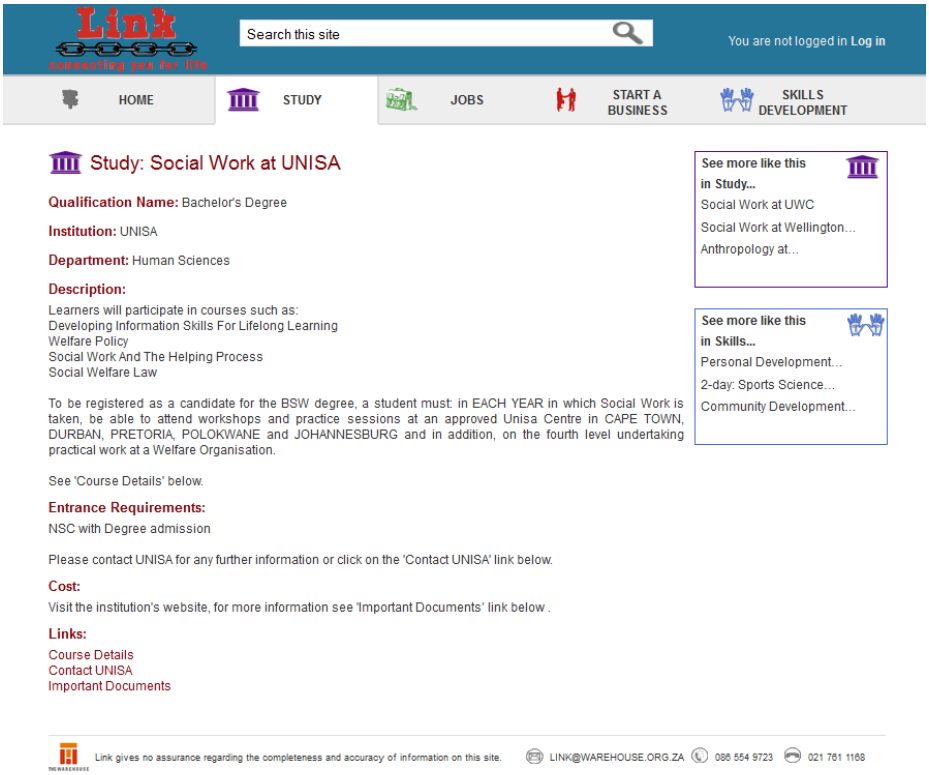

Fig. 2. Website entry detail page

3.2 Mobile System – LinkChat

The mobile system we developed was named LinkChat for the fact that it communicates with users via mobile IM. Although it could be reached from any IM platform which interoperates with Google Talk, all of our users used the MXit platform. Messages are relayed using the XMPP IM protocol [17] to and from our server-side code. Initially developed as proof of concept only, the system serves content in only one of

the three categories that the website does: study. Considerably more data has been captured in the study category than in the others.

Fig. 3 shows the process of a search using LinkChat as three consecutive screenshots – the system prompts the user to search, in response to which the user sends a search query. The system then responds with a numbered list of results. After sending the number corresponding with an interesting item, the system sends the entry detail to the user.

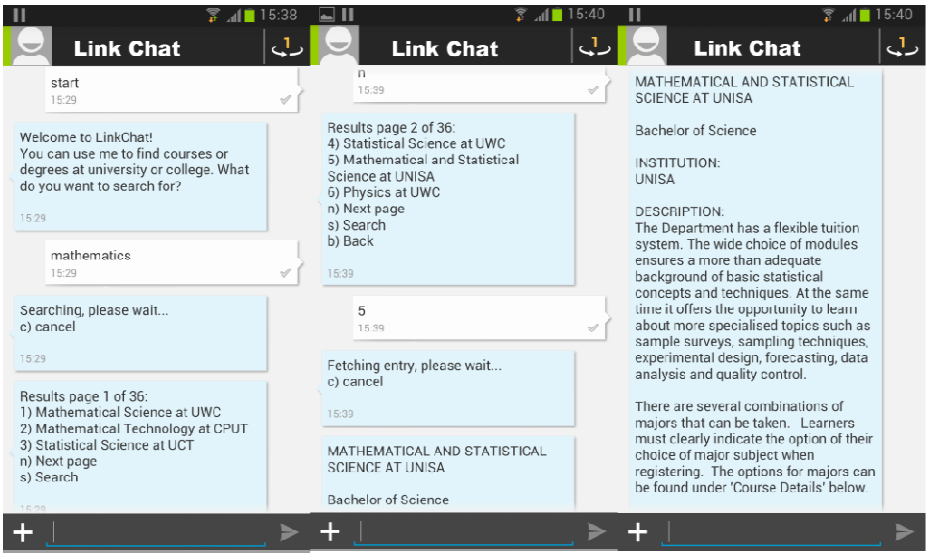

Fig. 3. Screenshots (read in columns top to bottom, left to right) showing the LinkChat search process, choosing an entry from search results and viewing academic course information

Note that for legibility's sake, screenshots in Fig. 3 have been taken with an Android smartphone which is more advanced than the smaller feature phones normally used by beneficiaries. Fig. 4 shows an example of a more typical user device, the Nokia 2700.

4 Formative Work

In the timeline of our engagement with Link, we pause in early 2012 at the conclusion of the first round of user testing of the mobile system, which was also the last work of the formative cycles. Before that point, we had spent time learning about our users and the Link programme, as well as collaborating with Link on the design, development and evaluation of the website. We report the findings that have relevance to the final project results from each of these activities in roughly chronological order.

Fig. 4. Nokia 2700 feature phone typical of devices owned by users

Table 1. Formative Link beneficiary technology use survey

	Location				
Measure	**Warehouse (n=9)**	**Manenberg (n=13)**	**Lavender Hill (n=2)**	**Mowbray (n=11)**	**Total (n=35)**
Ever used computer at home	3	9	1	3	16 (45%)
Ever used computer at school	7	9	1	1	18 (51%)
Ever used computer at library	4	0	0	6	10 (29%)
Ever used computer at Internet cafe	0	2	1	1	4 (11%)
Ever used computer (Total)	9	13	2	11	35 (100%)
Computer yesterday or today	1	7	2	2	12 (34%)
Cellphone yesterday or today	8	13	2	11	34 (97%)
Have used Google on computer	6	10	2	9	27 (77%)
Have used MXit on cellphone	7	11	2	10	30 (86%)

4.1 Learning about Beneficiaries – Technology Use Survey

In order to learn about the work of Link and its beneficiaries, we attended workshops at The Warehouse and at partner churches (see Section 2.2). While at these locations we asked participants about their technology use habits (in fact we also asked participants at later evaluations of the website, but for convenience we report all responses together). The results (see) confirmed our expectations that far more of the students would have very regular access to mobile phones than computers, and that most would be familiar with MXit. Somewhat surprising was that all had used a computer at least once, and most students had used the Internet on a computer in the form of Google – a positive sign for our website.

4.2 Website Evaluation

In preliminary evaluation of the website in August 2011 at Lavender Hill and Manenberg (see Section 2.2), users had significant difficulty using the site, but after changes to the user interface a larger second evaluation (twenty students in twelve groups at all three church venues, employing constructive interaction [15]) showed that if relevant data had been captured by the Link team, our site could help users to find it:

- Only two users expressed doubt about their ability to use the site on their own
- When given general instruction to use the site, in all but one case participants acted by searching, without needing to be told how
- A lack of computing skill and awareness of web search norms slowed task completion, but only in one extreme case did it prevent task completion
- Despite this being their first time using it, students began to develop skill at adapting their input to forms that the site could better work with.

We were aware that the constructive interaction method allowed the students whose computer skills were weaker to hide this from us, but in the context of use envisioned by the Link team, students with poor computer skills should be able to receive assistance at computers from church staff or fellow youth group members. At this stage, it appeared as though the Link team's original plan of information dissemination through the website might be adequate.

4.3 Changing Relationship Between Link and Churches

In late 2011 contact between Link and the Manenberg and Lavender Hill churches became less frequent. As a result, we did not visit either group again, and the focus of our engagement was solely on the Mowbray group. Significantly, we (researcher and Link team) interacted with this group directly, rather than having a layer of church leadership between us and beneficiaries. Because students were not directly affiliated with this church, it did not assume responsibility for providing access to infrastructure in the way that the Link team had hoped.

4.4 LinkChat Evaluation

LinkChat formative evaluations were intended to follow the same process as development of the website, but only a small first evaluation and the first part of the second evaluation could be run before spontaneous unsolicited usage lead us to abandon controlled evaluation. The following notable reactions from our users occurred in that first evaluation:

- *SN* was very enthusiastic about MXit and skilful in general mobile operation, but not enthusiastic about LinkChat: she lost interest in the evaluation after a brief attempt at use, choosing to message friends instead while we worked with other participants. She did ask for the LinkChat contact name for later use for the whole group.
- *LA* told us that she did not use MXit, and was reluctant to discuss her reasons. She was willing to try using LinkChat, and was capable of entering text for a search. However, she decided to stop using the system before she viewed an entry. She specifically refused a piece of paper with the LinkChat contact name on it when we wrote it down for others at the table with her.
- *NK* used LinkChat from her own MXit account on our phone. She demonstrated the ability to operate it, but said that she would prefer to use the website. She asked us to write down the website address, expressing confidence in her ability to access and use computers at the library.
- *OM* performed several searches, stopping only when the venue was closed for the day. He had indicated at the start of the session that he hoped to leave almost 15 minutes before he eventually did, from which we deduced his enthusiasm.

These results demonstrated users' ability to operate LinkChat, but their responses demonstrated almost every outcome imagined in our initial dialogue with The Warehouse: MXit and mobile phones preferred for entertainment (*SN*), outright rejection of MXit (*LA*), computers preferred for content consumption (*NK*), and unchecked enthusiasm (*OM*). The outcome of our planned comparative evaluation apparently rested on which of these users' attitudes the majority of our eventual audience reflected.

5 Comparative Work

The move from formative to comparative work occurred swiftly; instead of waiting for us to complete changes to LinkChat and launch it at a specific event like we had the website, students from our first LinkChat evaluation began to use the service whenever it was online. With the website already online, usage data for both systems began to accumulate before we had planned it.

5.1 Methodology

System Logging. Log files for the website were gathered between 22 November (official launch) and 31 October 2011. Log files for LinkChat were gathered from the day of first unsolicited use on 24 February 2012 until 31 October 2012. As far as pos-

sible, users identifiable as non-beneficiaries have been excluded from the logs. This was easiest with LinkChat, because all communication on MXit is tied to a user account which made it possible to identify users who were not students when calculating usage. It is likely that some visits from non-beneficiaries remain in our website logs.

Audience. The Link team had advertised the website's launch to 18 students (all but one from Lavender Hill), and in our formative evaluations of LinkChat in early 2012 we discussed or evaluated the site with a further four beneficiaries, for a total of 22. The Link team also advertised to colleagues at The Warehouse, but we do not have an accurate record of to whom or how many.

Students did not appear to need specific instruction to use LinkChat in their own time after learning about the service, making demonstration or evaluation equivalent to advertising. We advertised in this way to eight students, including the five discussed in section 4.4 above. LinkChat was also shown to non-students, including Link staff and colleagues in our research group.

Apart from these numbers, both systems were demonstrated to students who attended the Mowbray homework club on April 17, and the following week flyers advertising both systems were handed out. Unfortunately we do not have attendance records for those weeks, but over a four week period the next term the average number of students who signed the attendance register each week was 31.

Interviews and Demonstrations. Between late March and Mid June 2012 we conducted semi-structured interviews with six students who had were regular attendees at the Mowbray homework club, and demonstrated the two systems to five newcomers who only attended the homework club for the first time after our April advertising. In the interviews we asked students about their search behaviour before and after the Link intervention; in the demonstrations we attempted to understand students' operation skill while guiding them through the use of LinkChat and the website.

Reported Usage Questionnaire. After our April demonstrations, we handed weekly questionnaires to students at the homework club for eight weeks. The questionnaire asked students to inform us what searches they had performed on each system in the previous week, with the aim of supplementing our system logs by providing a way to identify users as beneficiaries or not. We report this primarily to acknowledge that the form may have had some effect as a reminder about the systems; as a source of data it was poor. Students often left without completing it, or filled it out incorrectly. The most useful information recorded was obtained after we included a section for suggestions they could give us about how to improve the systems. These suggestions were mostly requests for content on new topics, and not relevant to our question of availability and adoption.

5.2 Quantitative Results

Comparative numerical results from system logs are shown in Table 2. Despite being deployed for longer, the only measure which is higher for the website than for LinkChat is the number of unique users recorded. This number is subject to quirks of web

analytic tools – if a visitor used more than one browser, or cleared locally stored website tracking data after their last visit, they would be recorded as a new and different user. By contrast, users communicating with LinkChat were identified by their MXit ID, which provided a more reliable number. We note that 102 of the web users (92%) visited on one day only while 34 chat users (56%) visited on five or more different days.

Other numbers are significantly higher for LinkChat, despite it being available for almost three months less than the website, as LinkChat visitors engaged more and more frequently.

Table 2. Numerical results from LinkChat and website system logs

		Measure				
System	**Days Live**	**Unique Users**	**Searches Performed**	**Entries Viewed**	**Searches / Day**	**Entries / Day**
LinkChat	251	57	811	796	3.23	3.17
Website	345	117	116	52	0.34	0.15

The higher usage of LinkChat is consistent over the entire duration of its deployment. Fig. 5 shows a chart of the number of searches performed per month on each system, while Fig. 6 shows the total number of daily visitors in each month. The only month in which the lines representing the two systems touch is February 2012, in which LinkChat was only online for six days. The maximum in LinkChat usage (both graphs) is due to diffusion in March 2012, while the increase of usage on the website in October 2012 (Fig. 6 only) can be explained by a number of visitors who discovered the site through Google, i.e. not people to whom we had advertised the site.

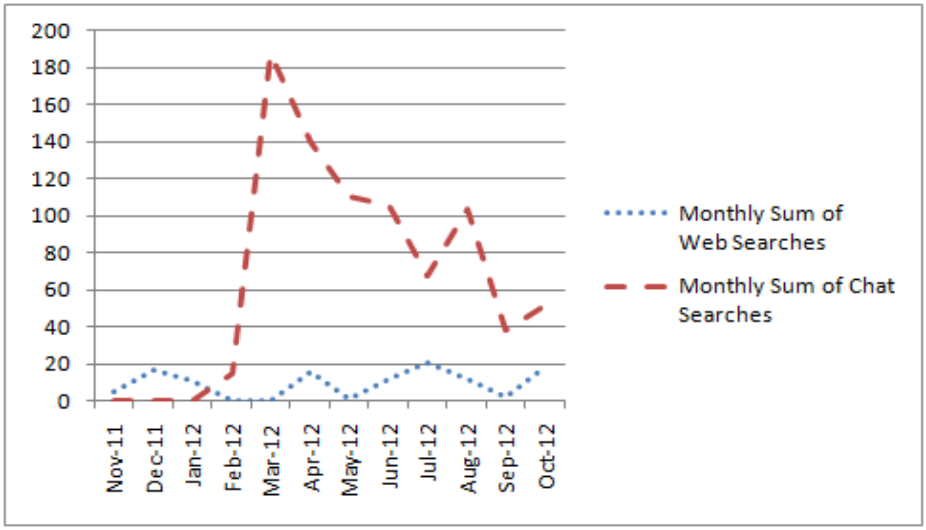

Fig. 5. Total number of searches performed on LinkChat and Link website per month

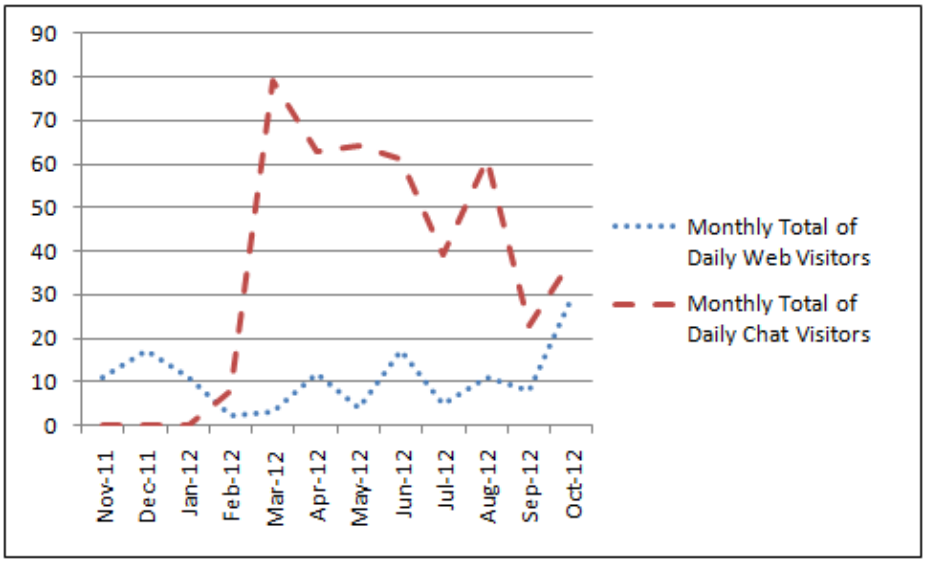

Fig. 6. Total daily visitors per month to Link website and LinkChat

6 Discussion

The clear quantitative advantage for LinkChat was already visible by March 2012. Although other studies had demonstrated the phenomenon of mobile adoption, this result was still interesting because it was in opposition to both the expectations of the NGO and some of our formative results. In order to refine our understanding of the results we saw, we began to gather evidence from interviews, observations of demonstrations, and observations in the formative cycles to understand the greater popularity of LinkChat. In so doing we hoped to discover design implications for future work in marginalised communities.

6.1 Unhelpful Existing Computer Infrastructure

Evidence we gathered about computer access was related to home, school or public library. What we learned underlined the lack of access which students had to conventional computing resources.

Home. *AM* explained to us that it was not normal for his peers to have access to computers at home, estimating that perhaps twenty percent of his classmates at school might have a computer in the home. Even then, he suggested that there would be family members with other priorities for the computers, such as a brother who wanted to play games (his hypothetical example). Others who spoke about computers at "home" confirmed that access was only possible for them because of their relationship with the owner: *MG* used his older sister's work laptop "once or twice a month" when he

visited her, *NM* mentioned her father having a computer for work and *AS* had access to a computer once a week when he visited his mother's former employer.

School. *NK* estimated that less than a quarter of her school was in the science "stream" that was given priority use of the school computers. When access did happen for the science students, it was shared with others at the same computer. *MG* was in the science stream, but when we asked how often he could use a computer he referred to visits to his older sister rather than to time at school. This may mean that his access at school was less frequent than visits to his sister, or that he did not see the school computers as relevant for the purposes we spoke about (they may have been reserved for school work only).

Library. A public library was near to the students' school and the tutoring venue. Library cards are free and we heard of the students taking shelter there on rainy days after school. The library had working computers, but the queue for use was long, and the allowed period of use was less time than *NK* and *YM* wanted. "Not good... I didn't finish my things", said *YM*, who felt that the worst part of the experience was the slow Internet connection. *NK*'s priority at the library was using Google to search for information about university courses. Despite her expressed preference for the Link website when she saw LinkChat (see section 4.4 above), the site had "slipped her mind" when she was actually at a computer. Having used LinkChat, she felt that while in front of a computer she preferred the breadth of Google results to the specific content furnished by Link. *YM* searched for similar content, but also mentioned social networking as a higher priority: "I have to Facebook first... have to check".

Lack of Skill and Confidence with Computers. In *AM*'s opinion, the lack of computer access lowered his and his peers' ability to operate computers: "I'm not used [to computers]", making access when it did occur less fruitful. *YM* and *NK* also found information search on computers slow work: "It's a process", said *YM*.

6.2 Confidence, Expertise and Convenience with Mobile Phones

Students had greater access to mobile phones than to computers. Some students had their phone with them at the homework club, which other students did not seem to find unusual. *NK* and *YM* did not have phones with them, but spoke of using a friend or family member's device. Mobile phones were therefore not restricted by venue.

Cost too, was not problematic, at least on MXit; some students had SIM cards from an operator which gave them free data for MXit. *OM* estimated that an evening on MXit chatting to friends would cost him R0.30 (0.03 USD), while *MG* told us that he preferred LinkChat to the Link website because it cost less.

For *CM*, greater access to mobile phones had created comfort with feature phone interfaces. She preferred Linkchat on the smaller screen of a feature phone to the website on a 15" laptop because a full sized computer screen took more time to scan for the information she wanted. *AM* contrasted his experience with mobile phones with his reservations about computers, saying "I know the phone". When we used a feature phone as conversation aid during an interview, *MG* told us that we were operating the phone too slowly.

A theme of convenience regarding LinkChat emerged as a result. *AM* preferred LinkChat, because "It doesn't waste time," and *YM* felt it was useful "... when in a hurry". *NK* preferred to use Google to the Link website (despite her earlier expressed preference for the website over LinkChat – see Section 4.4), but that expressed preference did not seem to be an issue in practice – she was the most frequent user of LinkChat, performing 118 searches on 37 different days.

6.3 Unsolicited Use of LinkChat

Some of the students who saw LinkChat in our evaluations continued to use it before we had intended them to do so. *SN*, whom we reported on in Section 4.4 had asked us to write the name of the LinkChat contact down but had not messaged it any further then, communicated with LinkChat a few days after. *OM*'s visit the next day took us by surprise, because we had not written the contact down for him. We later realised that MXit stores users' contacts on its own servers rather than the device on which the chat client is installed, and so students who used their own accounts on our demonstration phone had the contact ready when they next signed in on their own phones.

6.4 LinkChat Diffusion amongst Peers

More LinkChat users had been recorded in system logs than we had advertised the system to directly, and we met students who were attending the homework club for the first time, but who already knew of LinkChat. We learned of three ways in which peers had passed on knowledge of the system.

Face to Face. *NK* and *YM* told us that they had shown LinkChat to school friends on the friends' phones.

Online, through MXit. Although we had seen MXit purely as a platform for disseminating text, its social features also proved important. *OM* told friends in another city about LinkChat while messaging with them on MXit. *CM* gave a friend at a different school her MXit password so that the friend could use her own phone to log in and message the LinkChat contact from *CM*'s account.

Classroom Demonstration. An unusual, but noteworthy incident demonstrated the difference between the two systems in terms of opportunities for diffusion. Two students whom we had tutored took it upon themselves to advertise our systems. On March 11 2012 we received the following message on Facebook from *MG*:

"Me and (*AS*) *have came up with a briliant idea on how we can spread the word about your wabsite and we gona d it at school starting from tomorrow yeah. And wa our names there if theres space on the 'thank you list' bt if ther isnt no sweat w doin this 4 ya"*

We were pleased with *MG*'s initiative but uncertain about how we could acknowledge his contribution and how the Link team would respond to the idea of singling out students. We suggested that we talk at the tutoring programme the next day about the idea, but the conversation did not take place because we did not see *MG* there. Both

had been part of our second formative evaluation of the Link website, and because of the wording of the message we assumed that they proposed to publicise only the Link website (we had not personally introduced them to LinkChat).

On the 15th, *MG* sent a free "please call me" message to us, and when we responded he informed us that he wanted to demonstrate LinkChat at school but that it was offline. We were making code changes at the time, but started the server so they could proceed. By the end of the day twelve new MXit IDs had used LinkChat to perform 89 searches – the most of any day before or since.

MG later informed us that he and *AS* had told their Life Orientation teacher at school of the two systems. The teacher had asked them to demonstrate LinkChat to their class, but told them that it would not be possible to demonstrate the website until the school computer room was available for students to visit. When the demonstration of LinkChat took place, the website was not mentioned.

6.5 Reaction to LinkChat from non-MXit Users

The question raised in Section 4.4 of which observed reactions to LinkChat would be most typical of students was avoided by the spread of LinkChat beyond the Mowbray group. Regardless of how many of the students at the homework club were using LinkChat, it had proven better at attracting users than the website. Nonetheless, the question of why some users were negative and unresponsive about MXit remained.

One student in this position was willing to discuss: *NM* struggled with reading, and this made her uninterested in computers or mobile phones, especially text-centric IM.

In order to understand other reasons, we asked *MG* – himself an enthusiastic mobile phone and MXit user, but similarly to Bosch's interviewees, aware of negative perceptions [16] – what reasons he thought people might have for not wanting to discuss the topic. His opinion was that these students were a minority. A few might be embarrassed about only having "tilili", a slang word with which his peers described a phone with no features beyond voice calls and SMS. MXit also had "a bad side and a good side", and some students might be constrained by society's expectations of them because of their parents' position: "...because I'm a pastor's son, I'm gonna ruin his reputation [if I use MXit]". The same might go for teachers' children, although *MG* also noted that some of his teachers at school used MXit.

7 Implication for Design – Complications of Context

At the start of our engagement, we understood our dialogue with the Link team in terms of three variables: cost, availability and fit for purpose. We agreed that availability would be better for mobile phones, but disagreed about cost and fit for purpose. A greater awareness of technical information at the start of the project allowed us to correctly predict the broad outcome, but subsequent qualitative enquiry revealed more nuance. The qualitative data demonstrates a greater range of contextual factors:

- Setting, affecting the availability of technology through institutional rules: mobile phones were not tied to a single setting and so even though it is unlikely that no institutional rules apply at all, students did not raise difficulties of the sort faced when using computers, such as library time limits.
- Software, affecting the range of operations that technology can perform: the MXit software provided an interface with which students were familiar, and social features through which knowledge of LinkChat could spread.
- The user, who has capacity to operate a technology in different ways: students were familiar with mobile phones, and as a result skilled, confident and willing to read for long enough periods to consume information.
- Personal resources, which can be sufficient or insufficient for a given purpose, or offer workarounds making a particular use redundant: personal resources included devices on which to consume data, time, and money for airtime if necessary.
- Surrounding persons, with the ability to supplement resources, but also bringing social norms which may restrict access: other students could lend a phone when one personally owned was not available, or knowledge of how to operate LinkChat to aid a novice. On the other hand, some parents might consider their children's use of MXit a negative effect on their own reputation.

Most of these factors worked in favour of the mobile system we built, but will affect adoption in different ways in other contexts. They may, like the negative social implications of mobile IM we encountered, drive people away from a technology even while other factors are positive.

This list of contextual factors is not necessarily exhaustive; other data may reveal more. We note also the inter-related nature of factors; for instance personal resources could include a SIM card from the operator Cell C, making the cost zero when the software in use was MXit because of an agreement between the two.

8 Conclusion

Our work has shown how using mobile phones to access the internet suffered from misconceptions from the NGO supplier of online content (e.g., that mobile phones are not suitable for consuming large amounts of content) as well as negative associations amongst some members of the target user group (e.g., chat systems have negative moral implications). In the context of an NGO-led intervention in marginalised communities of Cape Town, we developed two systems, one a website for use on conventional computers, and the other a text interface for consumption on the mobile instant messaging platform MXit that works on feature phones.

We show that amongst marginalised youth in urban South Africa, mobile instant messaging as platform for content provision has a substantial advantage over the conventional web. It lends itself to word of mouth adoption, conveys information adequately in spite of the limited display capacity and access is cheap enough not to be an obstacle to adoption. We show that the platform is popular and well-suited to developmental purposes. A qualitative investigation into the reasons for its popularity revealed that a range of contextual factors caused this advantage: the technologies

were affected by setting, software in operation, users' capacity for operation, their personal resources and surrounding persons' resources and attitudes.

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