My Oral Village

Briefing Note #1
March, 2016

ORAL NUMERACY IN A DIGITAL WORLD
Briefing Note

How Will This Frog Leap?

In the past decade most adults have acquired a mobile phone, or at least, convenient access to one. As this 'leapfrog effect' creates an inclusive voice network without the cost of fixed telephone lines and copper cable, and as smartphones diffuse more widely, an era of full financial inclusion, without the cost of bricks and mortar branches, appears near.

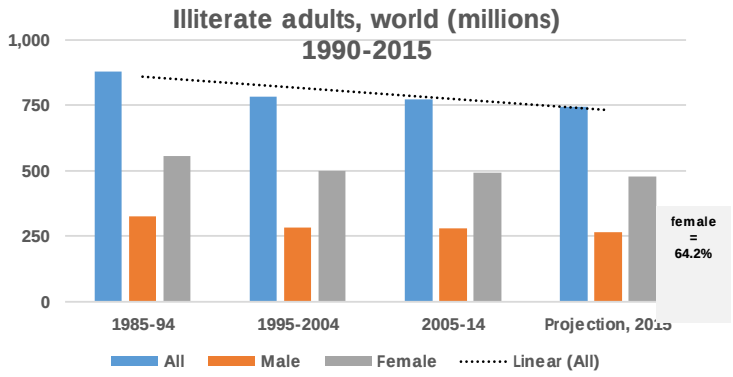
But digital financial inclusion is different from inclusion in a mobile voice network: it demands deeper behavioral changes. Consider another widely diffused technology: cash. Cash has linked humans in a global trade network for centuries. But the oral world is giving up pre-cash habits and practices slowly and grudgingly. Cash is adopted as a medium of exchange, but far less as a store of value.[1] Will digital financial inclusion spread like the mobile phone or like cash, or like a mix between them?

My Oral Village Inc recently conducted financial numeracy tests in Cambodia and Tanzania. Our goal was to profile the capabilities and motivations of illiterate individuals to use financial services, and to test solutions to address gaps.

Illiteracy

Illiteracy is experienced as a vulnerability, and illiterates reveal this disability cautiously. Illiteracy is not visible and often need not be disclosed. And literate civilization has been complicit in downplaying it. But even the official data is alarming (see **CHART 1**).

CHART 1



Source: UNESCO, May 2013

Officially there are 750 million adults who can't read or write -- two-thirds of them women. The trend-line is unhappy: UNESCO estimates that the number of illiterate adults has dropped by 16% in the past quarter-century – and only 4% since 2000.[2] There are regional differences: since the millennium the illiterate population has dropped quickly in the Middle East, but risen 26% in Sub-Saharan Africa.

Global literacy data is overwhelmingly based on census self-disclosure. However, a recent meta-analysis of studies from 20 countries, mostly in Africa, compared national statistics to national direct literacy tests and found that the former understate illiteracy by an average of 8%.[3] Extrapolating this variance suggests actual adult illiteracy is close to one-billion adults.

---

[1] For a detailed discussion, see Matthews, Brett H. *Oral information management tools.* My Oral Village Inc., Toronto, 2014, pp. 17-22.
[2] EFA Global Monitoring Team. Education for All, 2000-2015: Achievements and Challenges, UNESCO Publishing, Paris, 2015.
[3] Education for All, p. 140. Direct literacy tests in Kenya – a digital finance pioneer -- find 59% of women literate (census – 72%).

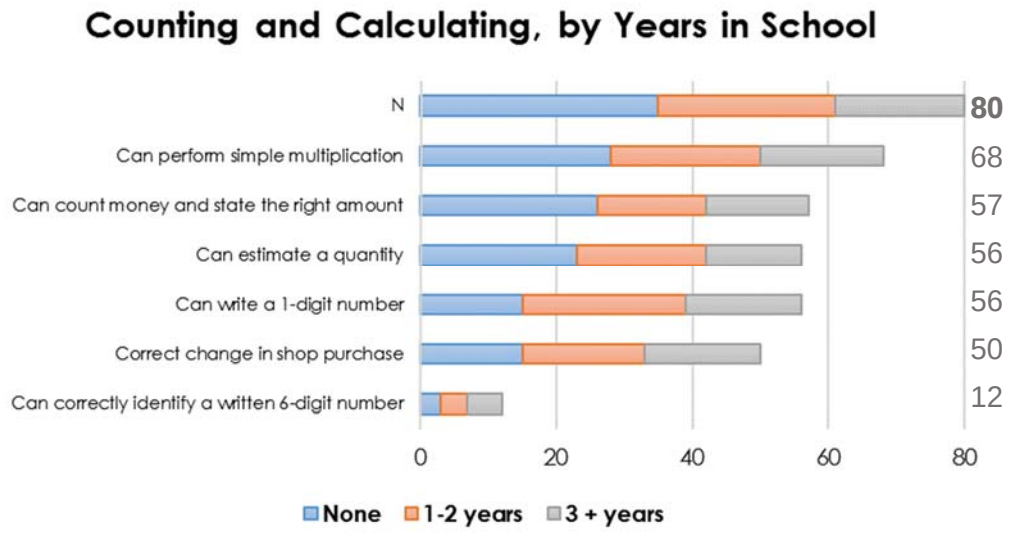
In short, nearly 1 in 5 adults world-wide can't read and write, and based on our current trajectory, hundreds of millions will still face this disability at the end of this century.

Oral Financial Numeracy: A Field Test

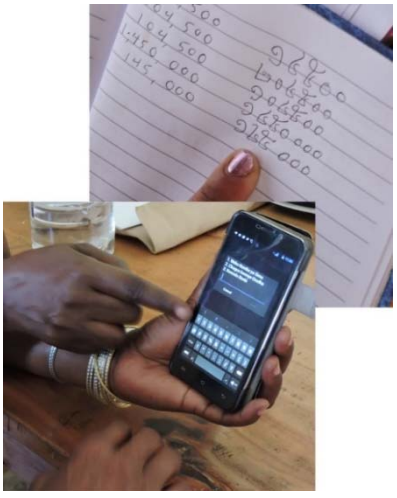
In 2015 My Oral Village Inc. interviewed 80 illiterate villagers (including 72 women) in villages in 4 regions in Tanzania[4] and two regions in Cambodia. Half the sample was drawn from each country. Median school participation was 1 year, and 35 had never attended school.

Twelve had access to mobile money accounts, mostly in Tanzania, but only two had ever used them. Sixty-four were financially included in some form: mostly in savings groups (51 out of 87 total accounts). Most sold produce in local markets. Most could also perform simple arithmetic

CHART 2



operations (see **CHART 2**) like mentally calculating change from 10,000 local currency units (LCUs) for an item costing 7,800, or working out how much 3 kilos of rice costs if 1 kilo costs 1,500 LCUs.



We had them count cash: 107,500 LCUs (worth about US $60 in Tanzania, and US $25 in Cambodia), composed for 16-18 notes and coins.[5] Even schooled individuals might make errors in such a task, but nearly three-quarters succeeded, clearly showing their experience and level of adaptation to the local cash economy.

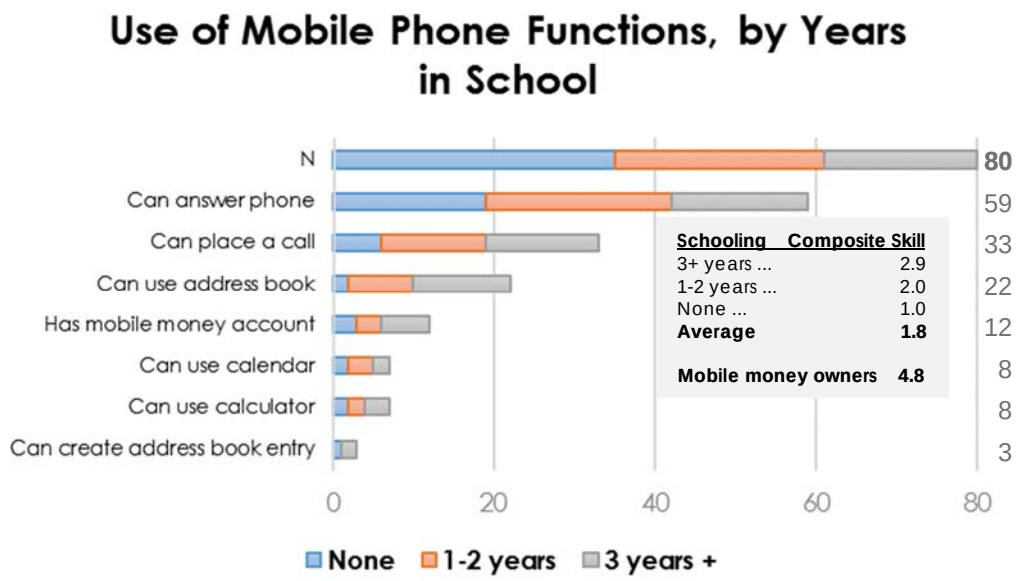
Only 12 respondents in 80 however, could identify the number from a list of 5 similar multi-digit numerals. Although 56 could correctly write a 1-digit numeral, they didn't know place-value code, the foundation of large-number arithmetic. Unlike other questions,

[4] Tanzanian field study pending: Matthews, Brett and Hawa Mnyasenga. *Financial numeracy in Tanzania.* (My Oral Village, Inc., 2016)
[5] The third digit from the left was varied randomly to limit the risk of copy-cat responses during serial testing.

nearly half refused to answer, often showing alarm at the list, as if decoding it was unimaginable.

This cognitive disability appears to mark a **multi-digit divide** that impairs digital financial inclusion. Only one of twelve respondents with mobile account access could use it independently. The challenge involves not menu navigation but inability to key a multi-digit string into the input field of the payment app.

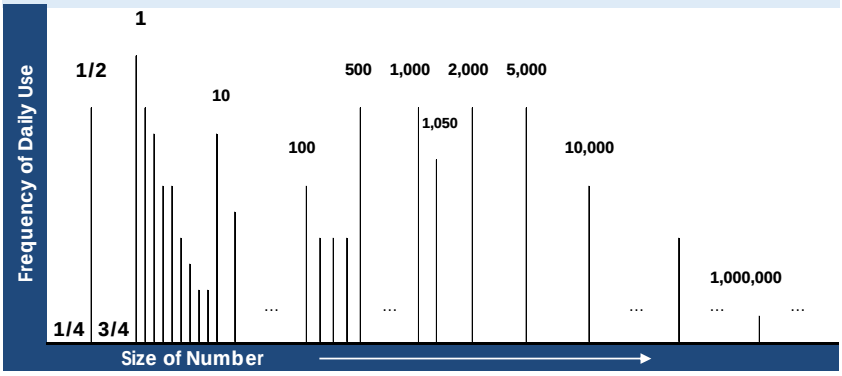
CHART 3



Thirty-six respondents had mobile phones, while another 35 shared one in their household (9 had no access). But take-up of phone features was much lower (see in **CHART 3**). Although most respondents are market vendors, many didn't know there was a calculator or calendar on their phone, and even fewer could use them. Five of the eight calculator-users were under 30, but a multi-digit shadow hangs over this skill: users reported trouble understanding numeral strings generated in the output field, leading them to abandon the effort.

During the study, we conducted interviews and focus groups on the **mental number line** (see **CHART 4**). Extensive research by Stanislas Dehaene and his colleagues has found that adults engage in an 'automatic and unconscious' visualization of positive numbers on a 'mental number line' suspended visually in space.[6] The oral number line in the villages

CHART 4
Illustrative Adult Number Line, Oral Khmer Speakers



[6] Dehaene, Stanislas (2011). The Number Sense [How the Mind Creates Mathematics]. Oxford University Press, New York, p. 75.

where we conducted our research proved distinctive for several reasons.

- Village life neither required nor used large numbers – for example 3+ digits. Even 2+ digit numbers were scarce.
- Larger numbers did enter people's lives, but *only in the context of cash*.
- Many literate features are absent: negative numbers, arithmetic zero, percent and decimals.
- Fractions were weakly articulated, with most awareness based on market usage.

The number line in the chart tells an important story: poor people are reluctant to save in cash *because the numbers are too big* for them to process. Long-term cash planning requires visualizing and manipulating large numbers – 10 million riels in Cambodia, for example – and then adding and subtracting millions of riels. This stretch is too long -- a limitation depicted in the number line's steep descent after "5,000".

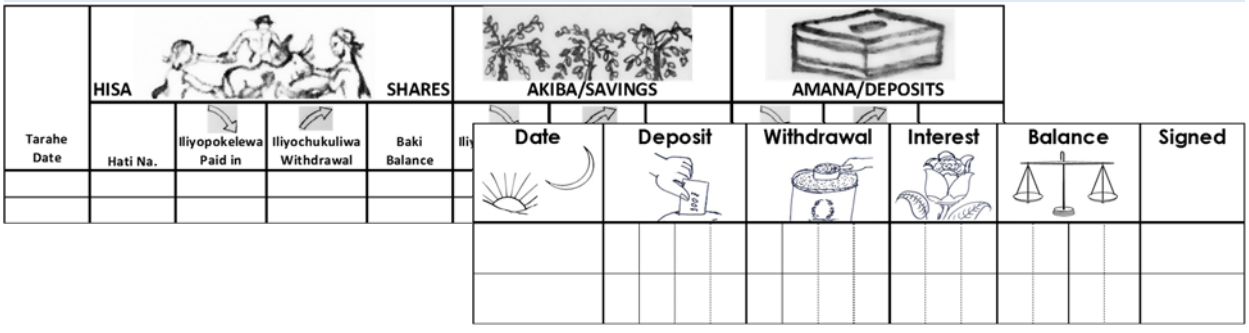
Oral Information Management Tools

In an earlier study of 20 illiterate clients at the rural SaveSafe replication in Bangladesh, I observed that they did not *expect* to be able to decode their personal passbooks. DFS features a cool new platform -- but it remains brutally literate. My sample faced two problems: together decisively disempowering.

1. *Tabular syntax*. Each page had many cells. Users lacked confidence in the left-right/bottom-top protocol for data flow. Column labels were in text, which users couldn't read.
2. *Multi-digit numeral strings*. Most users couldn't decode them, so they couldn't learn by trial and error (as a literate person might) by matching the number with expectations

Our fieldwork tested a passbook design intended to bridge this gap using oral information management (OIM) tools. OIM is a human-centred practice that places the principle of usability at the core of financial services design.[7] Instead of directly teaching tabular syntax, the OIM approach builds confidence in passbook navigation through pictorial and mnemonic cues, and then builds place-value skill by challenging users to up-date their passbooks under supervision. Pictorial and mnemonic cues must be instantly clear to users. For example, the image of 3 coffee trees above "Akiba/Savings" (see **DIAGRAM 1**) refers to the 3X leverage on loans for which members use these deposits. Images are explained to users, for recall in later transactions.

DIAGRAM 1
Passbook pages, with pictorial and mnemonic cues, Tanzania (right) and Cambodia (right)

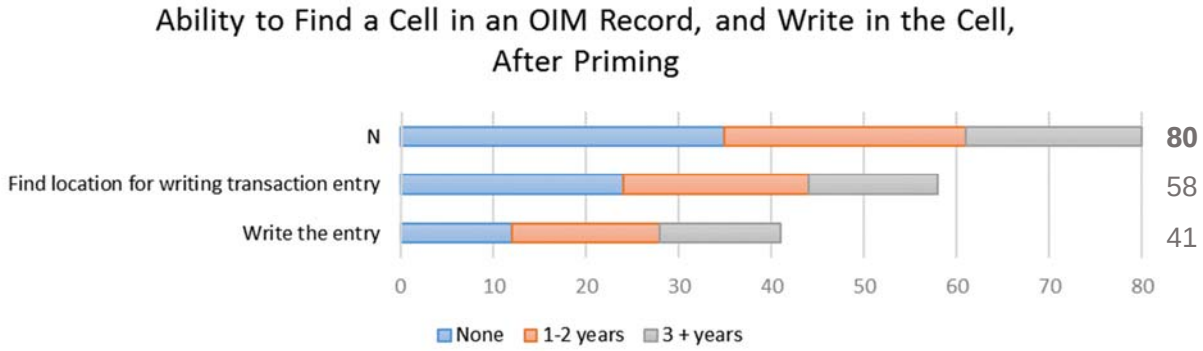


After receiving a 3-4 minute briefing in the meaning of the various images, participants were asked to help the researcher in three ways (see **CHART 5**):

1. write the date in the correct cell in the passbook to start a transaction today;

[7] There are a number of excellent sources, for example Don Norman's The Design of Everyday Things, Basic Books, New York, 2013.

CHART 5



2. using their fingers, point to the correct cell where a randomly selected transaction-type (e.g. 'deposit', 'interest charge' etc) would take place; and
3. if successful, take a pen and write the transaction amount in the identified cell.

Many had not touched a pen in decades, yet a majority wrote, regardless of schooling or age. But they struggled with the numbers of zeros (the largest source of error). In speech this can be unclear: in Swahili and Khmer (like English) the spoken "107,500" includes no spoken 'zero'.

Bridging the Multi-Digit Divide

How many of the financially excluded cannot decode a 4- or 6-digit numeral string? The financial inclusion movement doesn't know. It should be asking: it is hard to imagine a more basic building block of retail microfinance, financial literacy, or digital financial services.

A voice-enabled digital payment system can support healthy mobile payments inclusion. But full financial inclusion extending to savings, cash flow planning, and insurance must address the skill barrier. Oral adults will keep planning in-kind until they gain greater fluency with large numbers. This field test found however, that they are relatively confident in the presence of cash, which helps them to add and calculate. This and other solutions that build on oral strengths should be integrated directly into the retail financial services interface, to lever natural incentives-to-learn.

One approach to digital financial inclusion involves oral information management (OIM) tools and solutions. Everything need not be re-encoded from text. But -- when transacting with oral clients -- suppliers can encode most text that is *vital to their awareness and confidence* either in a form that they already understand, or in one that they can readily acquire.

The author would like to thank Ms. Hawa Nuhu Mnyasenga of the University of Dodoma for her skilled support during the Tanzania study, and Oxfam Cambodia and Ms. Sou Socheata for their support during the Cambodia study.

Partial funding for this study from Ms. Heather Broughton, president of My Oral Village, Inc., is gratefully acknowledged.

Errors and omissions belong to the author alone.

Published by My Oral Village, Inc.,
242 Gainsborough Road, Toronto, Ontario, Canada, M4L 3C6