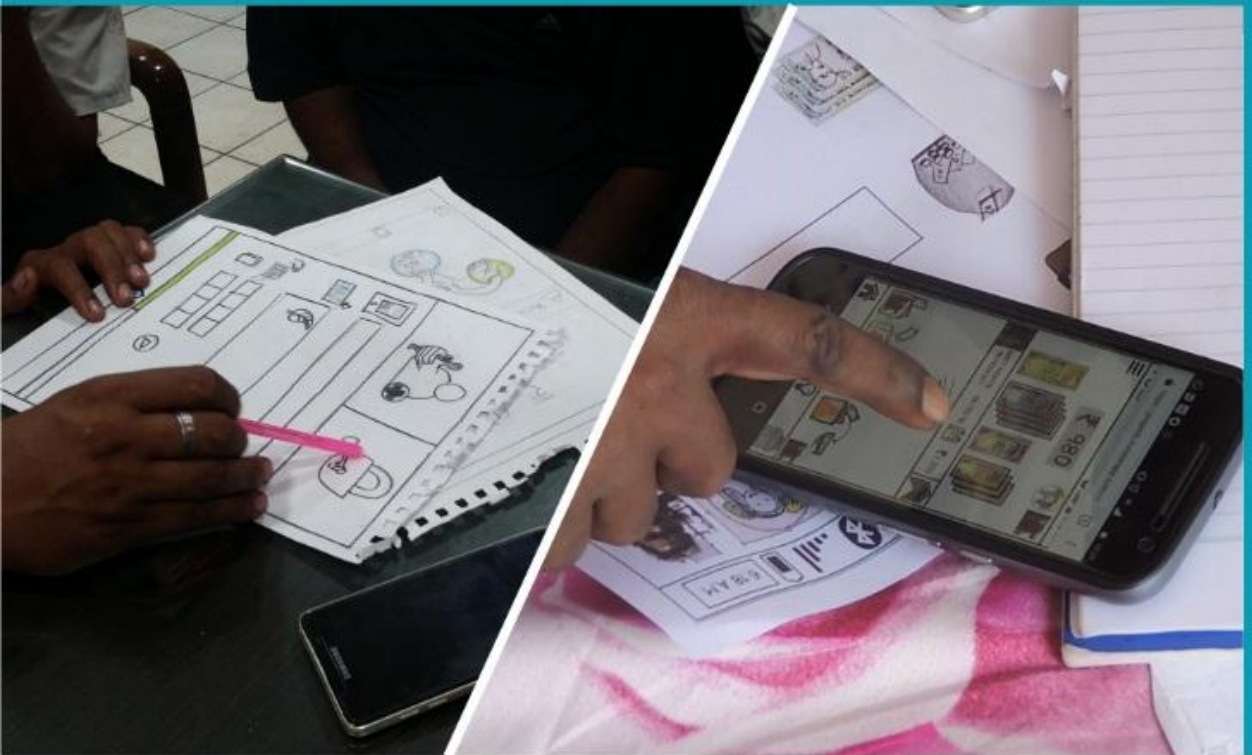
Digital Wallet Adoption for the Oral Segment in India:

Concept Development for MoWO (Mobile Wallet for Oral)



MicroSave
Market-led solutions for financial services

My Oral Village

This report has been authored by

Brett Hudson Matthews (My Oral Village)
and
Richa Valechha, Vivek Anand, Avantika Kushwaha, Saborni Poddar, Rachit Ohri
(*MicroSave*)

Special thanks: Graham A.N. Wright (*MicroSave*), Puneet Chopra(*MicroSave*), Priyank Mishra (*MicroSave*) and Akhand Tiwari (*MicroSave*), Brenda Gibb (Hubble Connected Ltd), Daniel Ansari (University of Western Ontario)

Abbreviations and Definitions

□	Indian Rupee
ASER	Annual Status of Education Report (Pratham)
FSP	Financial Service Provider
FDG	Focus Discussion Group
IME	Input Method Editor
NUUP	National Unified USSD Platform
OIM	Oral Information Management
OTC	Over-the-counter
OTP	One-Time Password
PMJDY	Pradhan Mantri Jan Dhan Yojana
RBI	Reserve Bank of India
SBI	State Bank of India
SMS	Short Message Service
UNESCO	United Nations Economic, Social and Cultural Organisation
USSD	Unstructured Supplementary Service Data

Literacy:
Ability to read and write phonetic text in any language, quickly and surely (fluently).

Neo-literacy:
Partial literacy, characterised by slower performance and more errors.

Illiteracy:
General inability to read or write phonetic text in any language.

Numeracy:
Ability to read and write numeric notation in any language, quickly and surely (fluently).

Neo-numeracy:
Partial numeracy, characterised by slower performance and more errors.

Innumeracy:
General inability to read or write numeric notation in any language.

Executive Summary (1/2)

What is "Orality"? "Orality" refers to the modes of thinking, speaking and managing information in societies where technologies of literacy (especially writing and print) are unfamiliar to most people. Orality encompasses not just speech but a wide range of modes for personal and collective information management that are preferred to text in oral cultures - from pictures, tallies and cash, to apprenticeship, rituals and songs.

Goal:

- To develop the conceptual wireframe of a mobile wallet for 'oral' (illiterate and neo-literate) people to use.

Key Observations:

- The oral segment includes about 264 million Indians (23 million youth aged 15-24).
- Most oral adults cannot decode multi-digit numeral strings (place-value) in large numbers, especially 4 or more digits (e.g. 5,045/5,405).
- This numeric cognitive disability will inhibit the use of mobile wallets, diverting users, whether literate or not, towards 'over-the-counter' markets.
- Most oral Indians are still not familiar with the new rupee symbol (☐).
- Men have learnt stronger mental calculation skills than women.
- Skills increased with age in both sexes and across occupations dealing in cash.
- The **oral segment has many strengths** to leverage, including common ability to:
  - read 1-2 digit numbers,
  - count and manipulate 4-digit numeric sums using cash notes and coins - relying on colour, proportional sizes, shapes and images, as well as numbers,
  - conduct basic **mental** calculations like addition, subtraction, multiplication, division, ratio – acquired through participation in the cash economy.

Executive Summary (2/2)

The **'neo-numerate' population** (about 1 in 3 in our sample)**:**

- could decode only one or two of the three numeral strings we showed in screening,
- performed better in all parts of our detailed numeracy diagnostic test, and
- most could read with reasonable fluency.

'MoWO' [Mobile Wallet for Oral]:

- a unique user-centred design prioritising usability and user experience in the oral segment;
- uses 'oral information management' (OIM) principles and devices;
- offers a 'sandbox' where oral users can learn numeracy without risking financial loss;
- uses devices like oral iconography, declarative/mnemonic pictures, colour, gesture and voice;
- process involves rapid prototyping, iteration between design/field, and testing of usability to facilitate 'guessability' and learnability;
- uses a unique cash-based 'input-method editor' (IME) so users can input large numbers safely;
- has functionalities to send money, request money, add money, paying bills and has an image-based phone book.

Recommendations for financial service providers and other stakeholders

- The oral segment should be treated as separate and distinct in digital financial services.
- FSPs targeting part or all of the segment should empirically test capabilities to identify relevant strengths and weaknesses of users to build highly usable and learnable designs.
- Early adopters in the segment may include youths aged 25-35, adopters of other mobile phone features like calculators and address books, and
- An open-source library of oral icons, addressing the full range of digital financial services, should be developed for India.

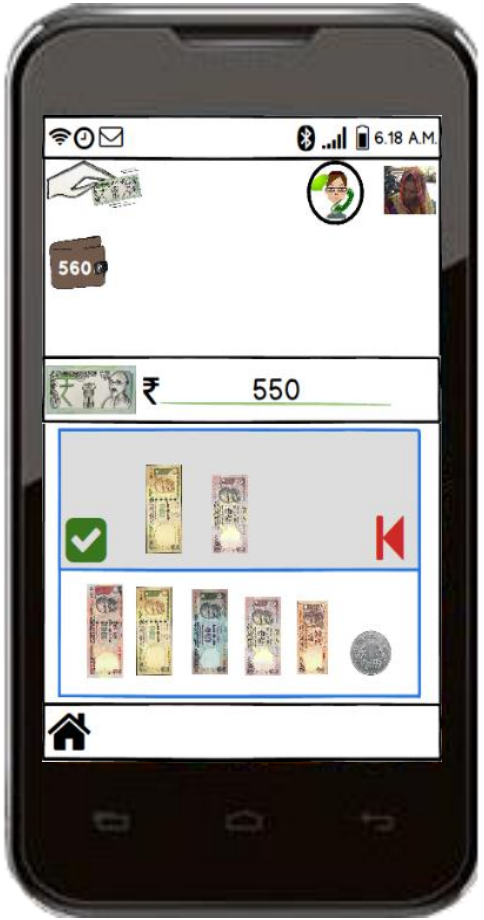


Table of Contents

1. Research Objective and Background	7-8
2. Field Observations	9-18
3. Mobile Wallet Design	19-23
4. Selected Wireframes	24-29
5. Testing Usability	30-34
6. Takeaways and Next Steps	35-39
7. Annexure	40-48

Research objective and background

Our objective was to develop a front-end customer interface for mobile wallets that addresses evidence-based usability constraints the oral (illiterate and semi-literate) market segment face, thereby providing a superior customer experience.

In 2015

71%

literacy rate in India

63%

female literacy rate

264 mn

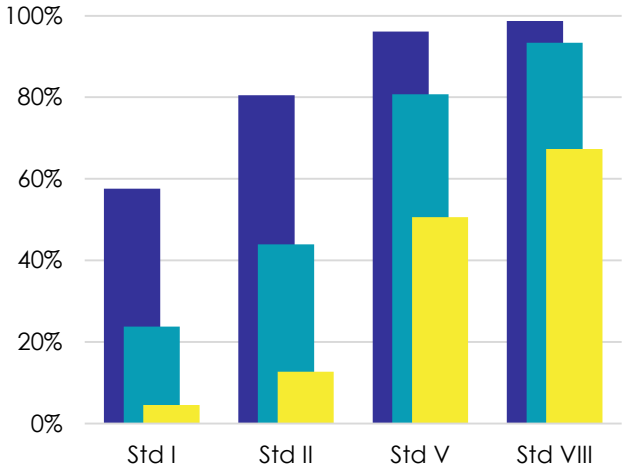
Number of illiterates adults 15+

Number of illiterate youths 15 to 24

Smart Phone Users

2015	240 mn
2020	520 mn

Basic Numeracy, Indian Schoolchildren, 2014

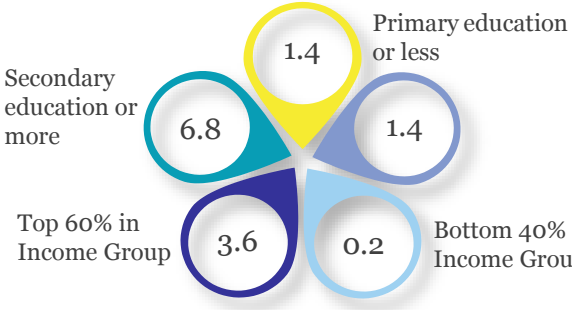


Source: Pratham. Annual Status of Education Report (Rural) 2014, ASER Centre, New Delhi, 2015.

"A hundred million children have gone through the schools in the last decade without basic reading and math skills." (Pratham, ASER 2014).

"Half of all children in Std V have not yet learned basic skills that they should have learned by Std II."

% Mobile phone used to pay bills: 2011



Source: Digital Payment 2020, Global Financial Inclusion Database

Research objective and background (cont'd)

A 2015 study by My Oral Village in rural Tanzania and Cambodia observed that *financial services providers can achieve better financial inclusion* by aligning offerings and incentives with the behaviour and motivations of **oral culture**. (Oral Financial Numeracy, My Oral Village, Inc. 2016)

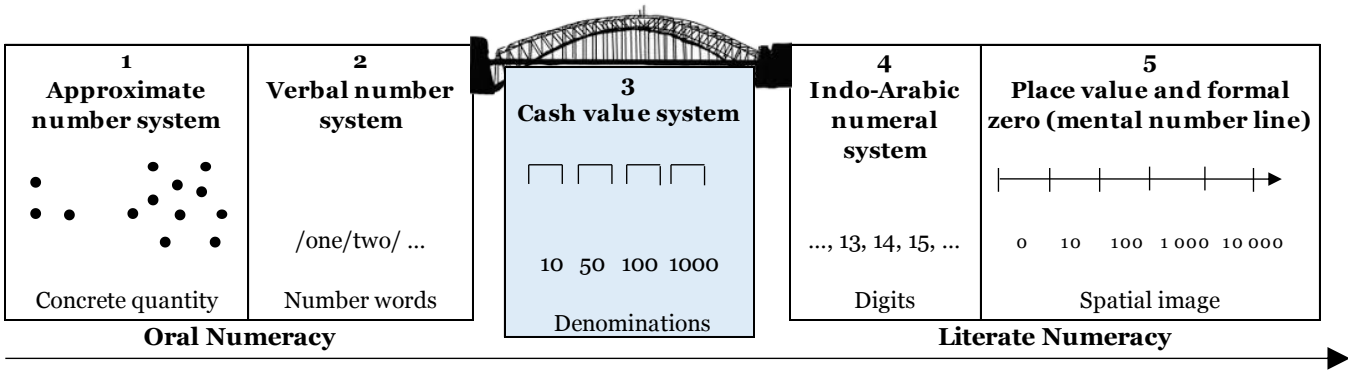
'**Orality**' refers to modes of managing information among people who barely or do not use text. Unschooled individuals learn oral abstractions faster, and recall them longer, albeit differently from literate ones. Literate abstractions in mobile money applications include:

content hierarchies	iconography
navigational process flows	large number coding (place value)
measures of time	measures of economic value

One literate abstraction is 'place value': the basis of large number coding. Oral individuals use **cash as a bridge** between written and verbal numeric abilities.

This allows them to work around place value while counting and manipulate large numbers than they could in verbal mode alone.

Stages of Financial Numeracy (Cash as Cognitive Bridge)



Adapted from Kaufmann et al (2016), *The Development of the numerical brain* , Oxford Handbook of Numerical Cognition

2. Field Observations

To design a mobile wallet for the oral population segment, our team first collected field data, using three tools.

Screening

Assessment of signing, reading and numeracy capabilities of respondents. There were three tasks – signing, reading and numeracy.

Capacity Test

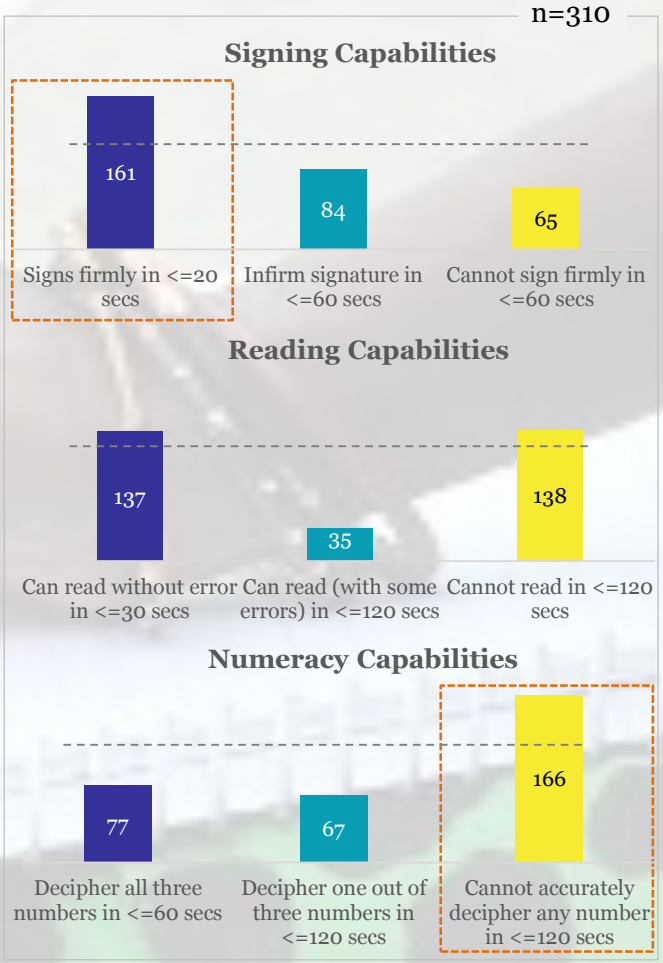
To understand the oral population's relationship with counting, calculations and money.

Focus Discussion Group

Exploratory discussions with respondents to develop and test wireframe designs of mobile wallet.

Signing, reading and numeracy capabilities

- A firm signature appears to be a fair proxy for the ability to read. Most of the respondents who could sign firmly were also able to read quickly. However, those who had infirm signatures – who still had not practiced at shaping the letters or had shaky erroneous signatures – and were slow in signing were far less likely to be able to read, even slowly.
- Numeracy was weaker than literacy: even among those who could sign firmly, only more than half could successfully read even one multi-digit number in ≤120 seconds.
- In each of the three categories most people took longer to perform the numeracy task – they were asked to decipher three numeral strings 4702, 5097, and 63801 – than the other two tasks. They found it more difficult than the other tasks and committed more mistakes.



How Indian oral population identifies notes?

Indian oral population identifies notes primarily based on a combination of colour, relative size and image of the numeral.

Colour

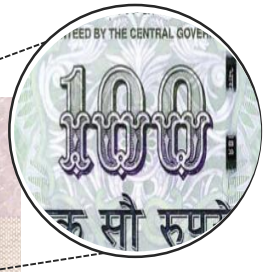


Image of the numerals on the centre-front of each note.

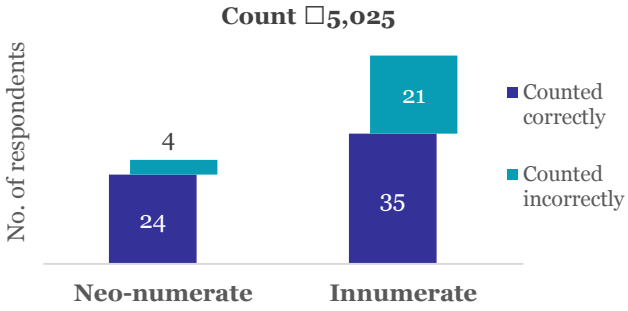
Relative Size

Other images like different type of motifs and pictures at the back side of different notes, appear to be less salient. The numeral string on the centre-front of each note need only be visually recognised; decoding it is unnecessary, though some respondents physically counted the **number of zeroes,** using this for identification, **in combination** with the colour and relative size of the note.

Counting Cash: An easy adaption for oral people

Respondents were provided with ☐5,025 in cash, and asked to count it. The 40 currency notes and coins included six different denominations: seven ☐500s, thirteen ☐100s, one ☐50, one ☐20, thirteen ☐10s, and five ☐5 coins. Nearly 3/4th of the sample, including most neo-numerates, and nearly 2/3rd of innumerates, answered correctly, taking an average time of 3 minutes and 18 seconds.

Considering that most of this group could not read 4-digit numbers, the fact that they *could decode them in cash* reveals a core adaptive competence. Also, oral people used denominations that they used more frequently as the reference point for calculations.



Case Study #1: Seema from Siswan Village, Varanasi

Seema is a 35-year old housewife and a neo-numerate. We gave her a wad of notes comprising seven ☐500 notes, thirteen ☐100 notes, one ☐50, one ☐20, thirteen ☐10 notes and five ☐5 coins. She segregated the cash denomination-wise and added up the ☐500 notes till ☐3,000.

We observed her tendency to chunk the amount in ☐1000. When left with one ☐500 note, she added up five ☐100 notes to reach ☐1,000 and put ☐4,000 aside. She stacked the remaining ☐100 notes coming up to ☐800 and smaller denominations counting ☐200 separately.

However, by the end, her memory failed to remember that the first stack of ☐4,000, the second stack of ☐800 and third stack of ☐200. She recounted the entire stack in the exact same way and added it up correctly; at the very end, she added the ☐25 in ☐5 coins.

When the team tested fake currency notes, oral subjects confused the ☐20 and ☐1,000 , which were the same size.

Oral adaptation to the cash economy

Unschooled adults in the cash economy learn the skills to count and calculate cash either by themselves or from people who are more experienced. As participants counted ☐5,025 in notes and coins, several skills and strategies adopted for speedy and easy understanding were visible. Novice counters sum the 40 notes one at a time, in no order, while the experienced adopt a good **chunking** strategy. A good chunk contains easily remembered groups of notes (such as '4,000' or '1,000', or all ☐100 and all ☐500 notes).

By contrast, the widespread presence of multi-digit numeral strings/place value in financial reporting has *not* led to successful adaptation among oral people. Incentives may be lower, as compared to their perceived complexity of learning. This can be addressed through **design**.

Cash Counting Strategies

Running Totals		Vs		**Chunking**
Chunking by total value of the stack		Vs		**Chunking by denominations**
Counting from largest value items to smallest		Vs		**Counting from smallest to largest**
Addition		Vs	 (10*3)	**Multiplication**

Oral understanding of place value of digits

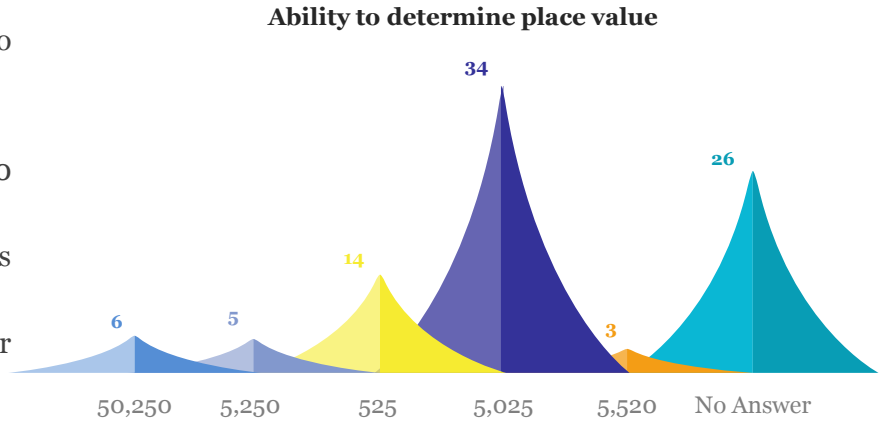
Place Value

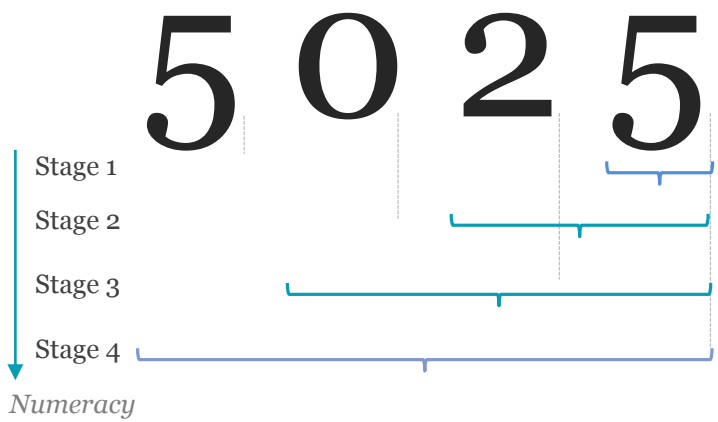
Respondents were shown a list of five multi-digit numeral strings and asked to identify ☐5,025 that they had just counted.

- Only 34 out of 88 succeeded, taking an average time of 40 seconds.

Most of the 28 incorrect answers involved place value errors (e.g. 525, 5250 etc.) and not numeral recognition errors.

- The oral understanding of zero is 'nothing'. For example, the written digits '525' appears quite plausible if the written meaning of zero is not clear.
- The only response that did not present the numbers in the correct order was '5,520'. Very few people made this error.





Putting Digits Together

Zero was confusing for most of the participants unless it appeared only at the end of the string. When asked to express the number in rupees, people made mistakes like "four thousand, seven thousand and two hundred".

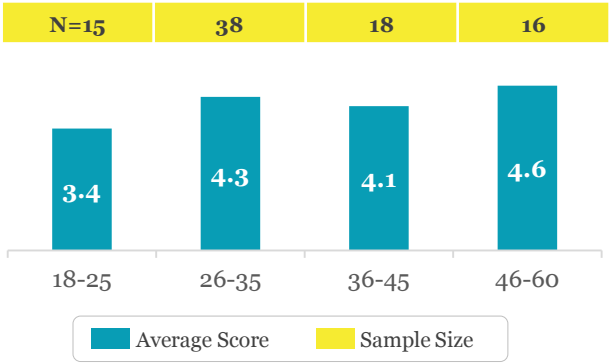
People with low levels of literacy understand single or double digits but face problems in deciphering four or five digit numeral strings.

Most innumerate participants could recognise single digits while neo-numerates could often recognise two, or even three-digit strings. This leads to partial formation of numbers, for example by calling 4,702 "forty-seven and two".

The impact of cash economy on mental numeracy

Respondents were asked to perform mental calculations for 7 questions. They were given a score in the range of 0-7 (1 point for each right answer). The average score for the entire sample was 4.2. Neo-numerate respondents (5.0) scored substantially better than innumerate ones (3.9).

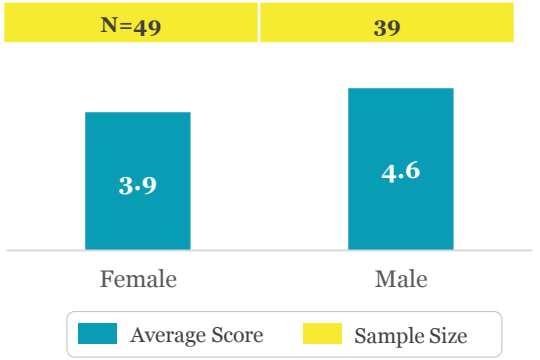
Mental Arithmetic by Age-Group



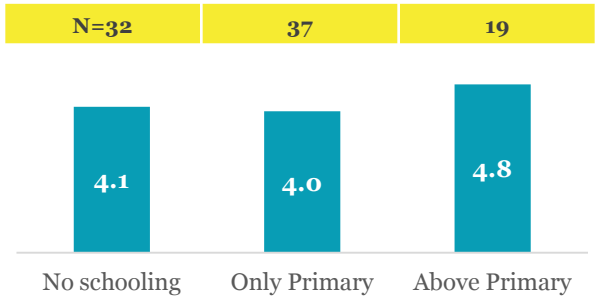
- Older respondents outscored younger ones.
- Men (4.6) scored better than women (3.9).
- Labourers and respondents engaged in 'other' activities (mostly self-employed) had greater numeric skills as the ability to perform mental calculations is critical to their livelihoods.
- The relationship between mental numeracy skills and schooling is complex. Consistent with the Pratham/ASER data (see Slide 6), it is weak.

These indicators suggest *a link between mental numeracy and exposure to the cash economy*.

Mental Arithmetic by Gender

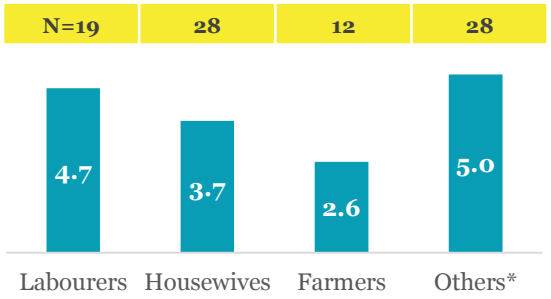


Mental Arithmetic by Schooling

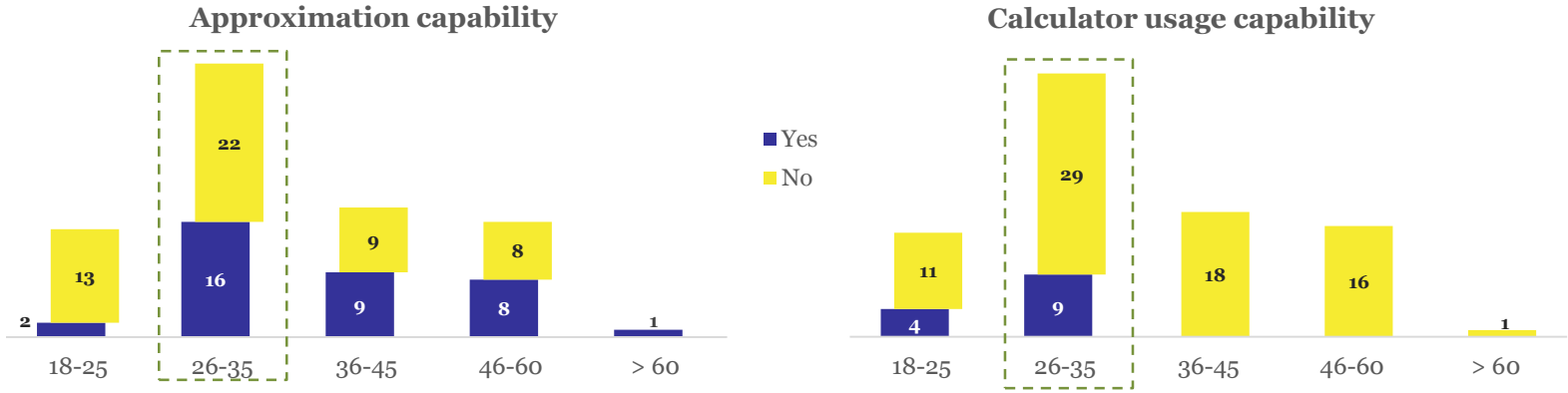


Note: 'Others' under occupation include fruit and vegetable vendors, seamstresses, tailors, *phulkari* workers, weavers, potters, dairy sales, cab drivers, maids, mechanic and mason, among others.

Mental Arithmetic by Occupation



People within the age-group of 26-35 years could be *early adopters* of new mobile technology



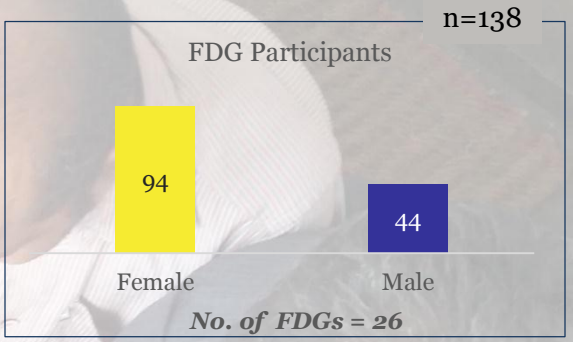
Question: You have set a goal of saving ☐50,000 in 5 years. How much do you have to save each month to reach your goal?

- People in the age-group of 18-25 years demonstrated weaker mental math skills than those in the age-group of 26-35 years. Thus, elders performed relatively better than their younger counterparts since experience with the cash economy improves mental math over time.
- In the age-group 26-35, a fair percentage (9 out of 38 people) could answer the question correctly using a calculator. No one above 35 years of age was able to use a calculator to answer this question.*
- People within the age-group of **26-35 years** have fair mental math skills and higher likelihood to adopt new technology since at this age people have a higher willingness as well as higher ability to learn. **Thus, this group have the potential to be early adopters of new mobile technology.**

***Please note:** Participants were provided mobile phones for calculations.

Insights from Focus Discussion Groups (1/2)

Focus Discussion Groups were conducted with participants with different literacy levels to gain insights about contours of mobile wallet interfaces. A prototype of mobile wallet interface was developed which went through multiple iterations to incorporate feedback of the users.



Abstract icons are easier for literate people to understand than for oral people. *(For more details, please refer to Slide No. 7)*

- In cases where icons looked exactly like what it represented, for example, bus, airplane, electricity, most oral people were able to understand it.
- They were also able to understand the arrows, which were used to show the movement of money.
- Oral people do not understand abstract icons or symbolic depictions, such as, the front of an engine for a train, arrow to show send money to a wallet, a plus sign and rupee symbol to add money to a wallet, to name a few. Literates are able to comprehend abstract icons as they can read the accompanying text to confirm what these icons stand for.
- We observed that oral people were associating movement of money with hand positions corresponding to money exchange in real life. They specified how the hand on top and palms open positions denote giving and requesting money, respectively.

Oral people can be primed through colours. They associate mobile wallet with mobile phone, so any icon which is green in colour is for proceed, much like accepting a call by pressing the green icon. Similarly, if red in colour, it stands for cancellation like the red icon is for rejecting a call.

Insights from Focus Discussion Groups (2/2)

A fair percentage of people understand vernacular language but not English. Thus, mobile wallets should facilitate use of vernacular language to enable a wider section of mass to access wallets.

Many people in our sample were innumerate and illiterate, hence:

- Remembering an alphanumeric PIN is difficult for them than recalling pictures of things associated to real life; the latter has higher recall accuracy for a longer period of time. The numeric PIN is also relatively easy to remember for them, however, when it comes to letters of the alphabet, this segment is unable to recognise and therefore relate to it.
- A number of people were not able to decipher money in terms of 4-digit numeral strings. They, however, were able to identify currency notes and perform any numeric calculations by using it.

Bill payments, merchant payments and sending/receiving money are the most preferred transactions that oral segment will use on mobile wallet.

- As early users, they would be cautious in transacting large amounts of money from a mobile wallet.
- The key advantage of using the above mentioned use-cases is the convenience it provides in enhancing accessibility.

3. Mobile Wallet Design

Designing MoWO: Mobile wallet for oral

Project Goals

To expand mobile financial inclusion by addressing three key constraints faced by the oral segment:

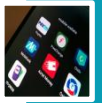
- Knowing opportunities: If oral clients do not understand the service offerings, they cannot take advantage of them.
- Illiteracy/innumeracy: If this affects their confidence in the interface, oral adults will not use it or learn to understand it.
- Consumer rights: If oral consumers cannot learn to use the interface, they will not understand their rights.

Principles of Oral Information Management (OIM)

1. OIM tools must enhance client-side financial product usability,
2. It should provide positive incentives to clients to acquire useful financial numeracy/literacy skills,
3. Tool design and application must be client-guided,
4. On a net basis, OIM tools should strengthen existing control systems, and
5. It should not be inconvenient to or embarrass literate clients.

Product Users:

End customers: Oral people who deal with cash



Clients/service providers: Mobile wallet service providers in India who are targeting oral customers dealing with cash

Product Attributes:

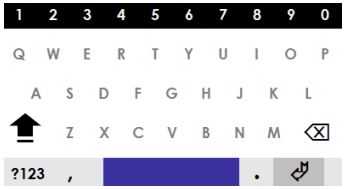
- Easy and convenient access to a safer way for digital payments, such as:
  - Sending money
  - Mobile Recharge (prepaid)
  - Electricity and mobile (postpaid) bills
  - Merchant Payments
  - Add money (through agent outlets, through bank account, through debit, ATM and credit cards)
- Easy registration for end users (sign up, sign in and sign out)
- A safe 'sandbox' or demonstration to learn the interface before risking money in it
- Transaction History

In order to create an easy-to-use mobile application for oral segment, various design ideas have been used that are explained in detail in the following slides.

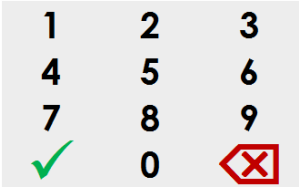
Cash-Based Input Method Editor designed for oral users

Type of Input Method Editors

Alpha-Numeric



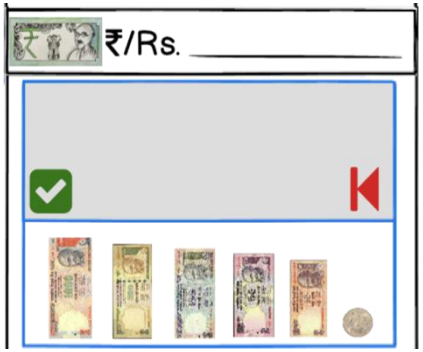
Numeric

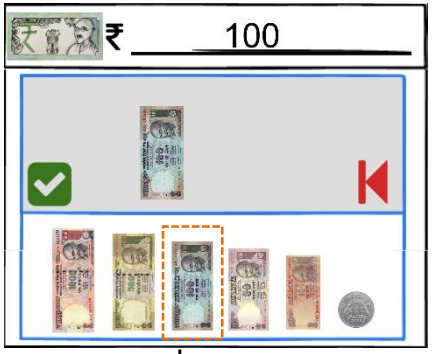


Cash-Based

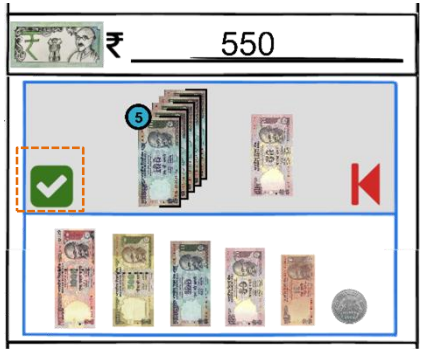
An input method editor (IME) is "an operating system component or program that allows any data, such as keyboard strokes or mouse movements, to be received as input." The Cash IME was easily accepted in testing by both innumerate and neo-numerate users.

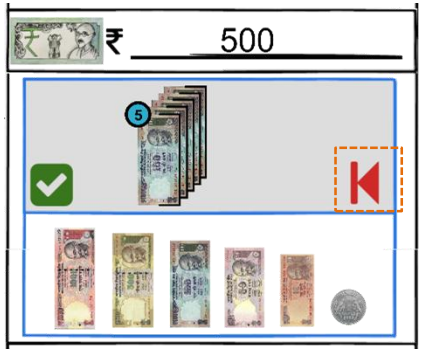
The cash-based IME provides a safety net for the oral users. Mistakes can be identified easily as the cumulative number of cash units is visible in the upper panel (grey in the diagram). Besides, a curious user can control the cash inputs to observe their impact on the Indo-Arabic numeral string, learning place value in the process. Error correction follows the logic of cash counting, not the logic of numeric input. A user who has inputted five ☐100 notes and a ☐50 note, respectively, to make it ☐550. If the user touches the red backspace button, it will eliminate the *last note* entered, resulting in an entry of ☐500.





tap





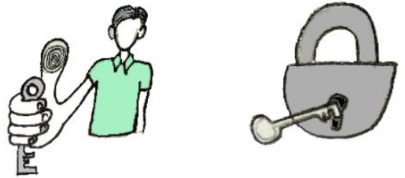
Developing declarative and mnemonic pictures instead of icons

It is common to refer to 'icons' in the interface of a mobile wallet. 'Icons' are pictures that have been reduced to the fewest and most abstract graphic elements consistent with users perceptions of an activity (e.g. sending money) or a concept (e.g. a place to keep the money). Iconographic abstraction delivers much of the 'clean' image so valued by website and app designers.

Oral abstraction and hence, oral iconography too, is possible, but should be grounded in oral usability with a concrete, detailed appearance that may look less 'clean' to a user accustomed to literate abstractions.

Send and Request Money

Sign up and Sign-In



For Send and Request Money, hand gestures such as shown in the diagram above proved most readily understandable. Like many oral abstractions they are readily understood by literates and likely to please various user categories. Oral focus group participants clearly understood them and added an important graphic dimension: *money 'sent' goes down from giver to receiver, and money is received from above.*

For ***'sign up' and 'sign-in',*** the team generated and tested the graphics culminating in the above diagram. Oral users understood that the key is being offered as a solution to access some benefits. When the team explained the concept of mobile wallet, they were able to relate the *'key' to an instrument that provides access to mobile wallet and believed it could be used to unlock the wallet whenever a need arises to use it.*

Deepening usability and safety: Multi-coding

The only way to ensure integrity of transactions is through effective two-way information flow. Hence, multiple codes, as a measure of safety, can be used in mobile wallets to strengthen the belief of oral users that they are following the correct procedure while conducting the transaction. Some of these codes are listed below:

Simple Text:

Final designs may include simple text so that a literate or neo-literate user, i.e. nearly a quarter of potential users, would quickly understand the content comprising text and not place-value. This means for example, they could read or write "two thousand and twenty-five" – but not "2,025".

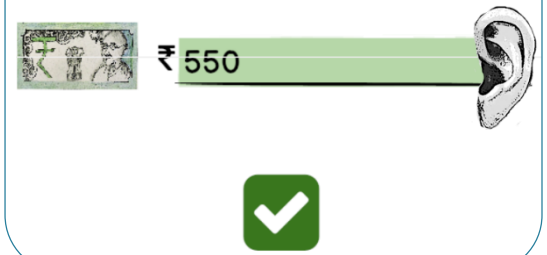
Voice:

The image on the right showcases how voice-based mechanism will work in mobile wallets – for example to validate a send amount. Once the user inputs the number using a cash IME, he can touch the ear icon to hear the entered amount i.e. "five hundred and fifty". Hence, the user receives a voice receipt complementing cash IME.

Sonification:

'Sonification' uses non-verbal sounds to communicate data. For example, different cash denominations can be associated with different sounds (from short and high for low values to longer and lower for higher values). Since this approach is independent of language, it could be useful for long-tail languages that are unlikely to receive good machine-support in the near future.

Voice in a Multi-Coding Environment



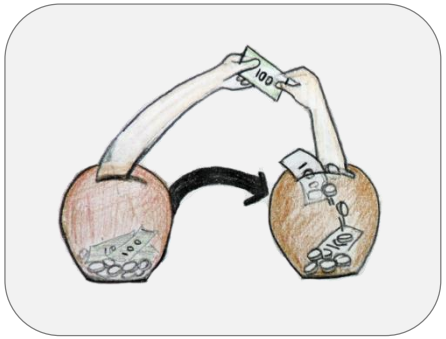
4. Selected Wireframes

Iterations: A crucial step in designing mobile wallets

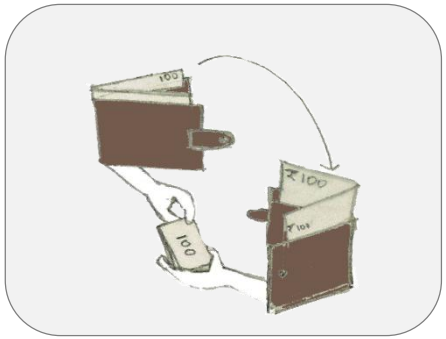
The interface design went through multiple iterations before arriving at the final wireframes (wireframes of send money and sign up are shown in Slide no. 25-28). Icons of *gulaks,* wallets, hand gestures, arrows and cash notes were developed and modified through each iteration. These icons were used in the wireframes and went through multiple focus group iterations as the team tested various configurations.

Many participants considered *gulaks* to be for children, and it was difficult to develop an easily recognisable wallet. Arrows caused confusion when 'request money' and 'add money' had to be differentiated. Below is a set of images depicting the evolution of the "send money" icon with the help of rapid prototyping on field.

Iterations made for 'Send Money'



Gulak

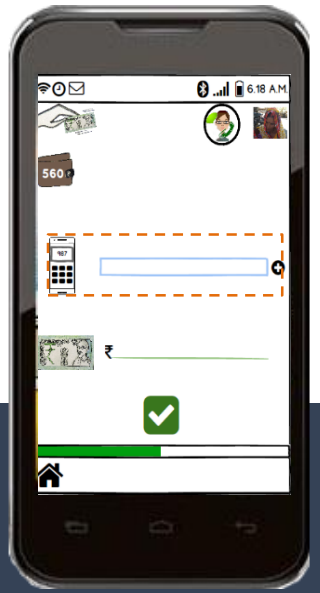


Wallet

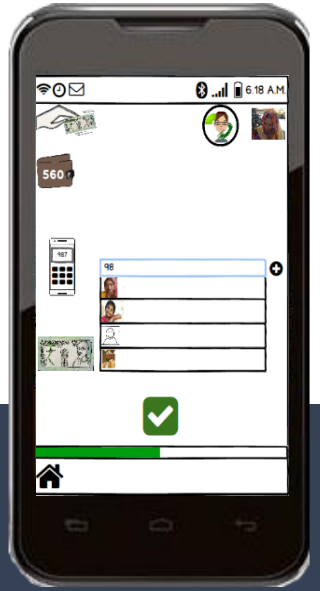
Hand movement depicting that money is being given to someone

Transaction Process – Send Money (1/2)

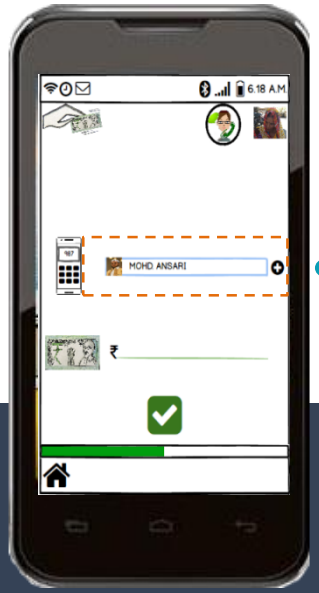
Home Page



Step 1-
Send Money Page



Step 2-
Enter the mobile number with the prompting of address book



Step 3-
Enter the amount with the help of IME key pad.

Transaction Process – Send Money (2/2)

Step 4-
Select the numeric or cash-numeric keypad

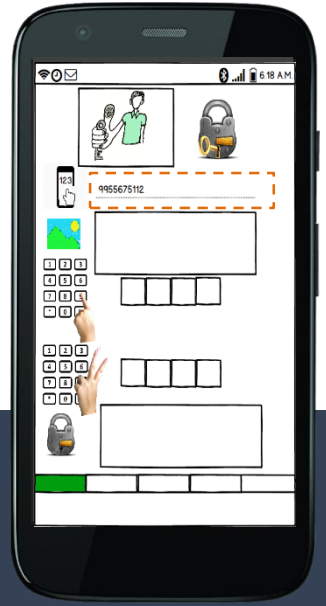
Step 5-
In cash-numeric IME amount is selected by touching currency notes.

Step 6-
After entering the currency notes and verifying, click green button. The amount is displayed on the relevant field.

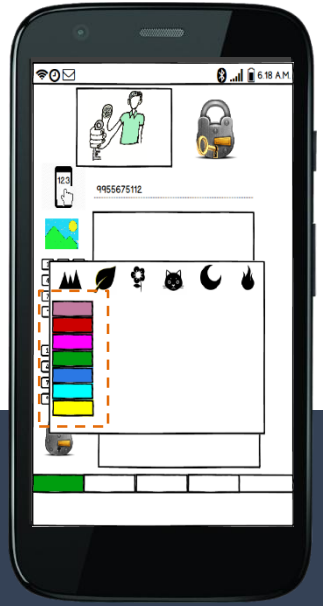
Step 7-
Confirm the transaction by touching the green "okay" button.

Step 8-
Transaction complete: page displayed with relevant details.

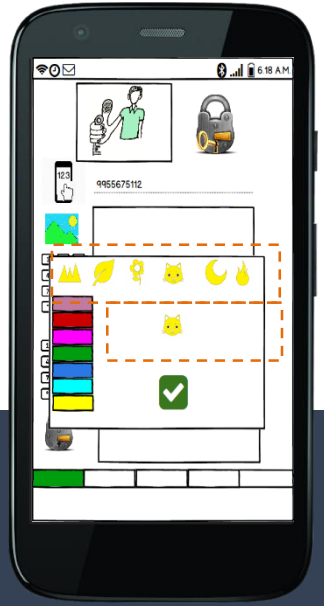
Registration Process – Sign Up (1/2)



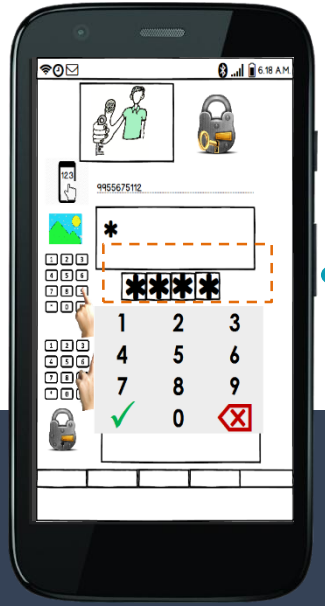
Step 1-
Enter phone number



Step 2-
Choose colour

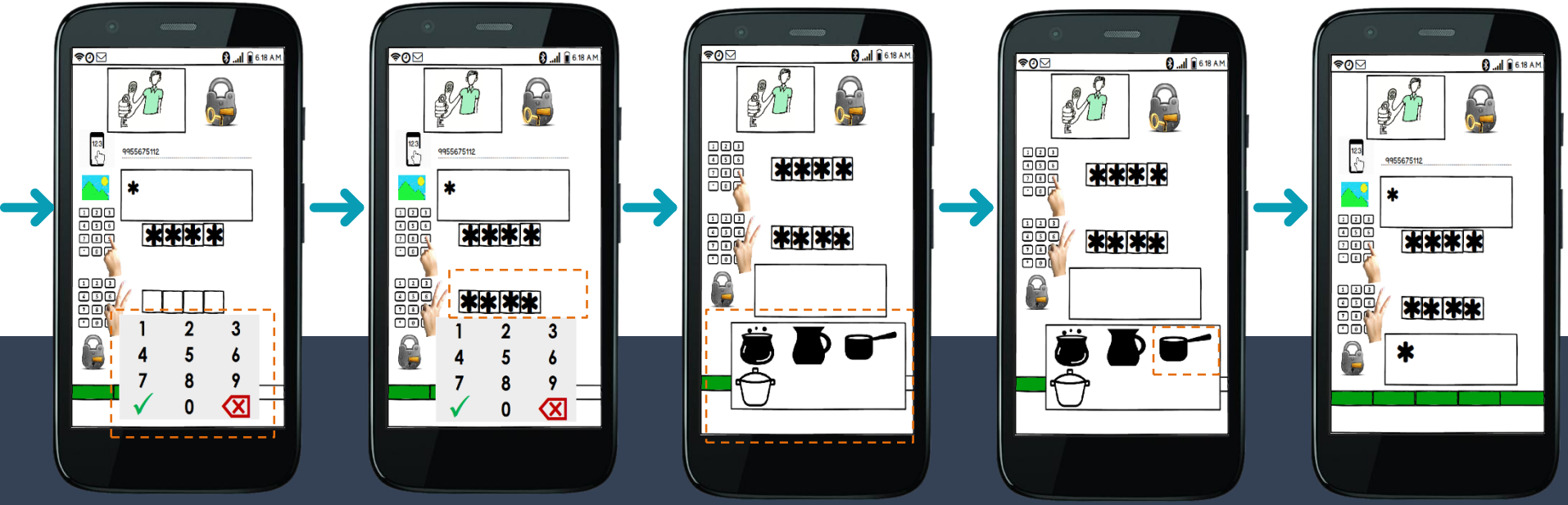


Step 3-
Choose picture of your choice and then click “OK”



Step 4-
Enter the PIN with the help of IME key pad

Registration Process – Sign Up (2/2)



Step 5-
Re-enter PIN with the help of IME key pad

Step 6-
Confirm selection

Step 6-
View security icons for selection

Step 7-
Select a security icon

Step 8-
Sign up complete: page displayed with completed fields

5. Testing Usability

Testing the oral individual's ability to use our mobile wallet design

Methodology and process for testing the usability of our solution

Methodology

Three versions of the wireframes were tested in 2016 on smartphones in Bihar (30th October) and Lucknow (9th and 18th November).

- The tests conducted in Lucknow involved 26 participants (24 women) recruited through Sonata, a local MFI.
- Nineteen participants could recognise individual digits, but not 4+ digit numeral strings (many had trouble with pairs of digits).
- The other seven (including both men) were neo-numerates who could recognise only one 4+ digit numeral string.

Process

In the first and second usability test, each participant received a 3-5 minute briefing on how to send money, using the fictional case of sending ☐550 to Mohammad Ansari. As neither mobile money nor mobile wallets were familiar concepts to the participants, it was necessary to first secure their interest in the idea of using mobile wallet.

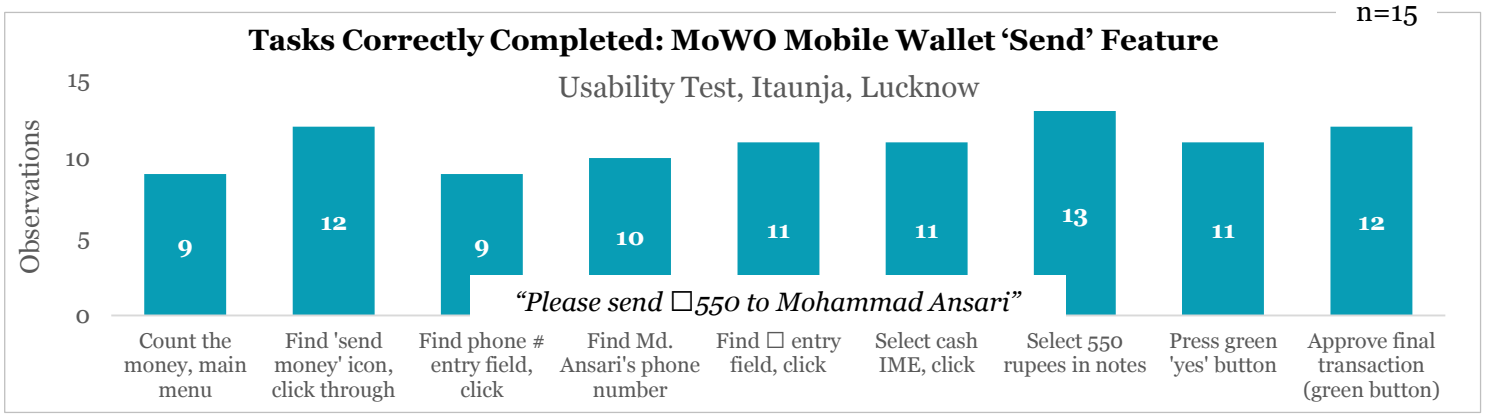
Once the briefing was complete, the team allowed an hour to lapse before administering the test. The test took a few minutes for each person and only the first attempt was counted. When errors were made the person was corrected and taken to the next question.

In the third phase, two new concepts were tested. A few participants were shown mock video of 'send money' transaction and an hour later they were asked to perform the same task.

Additionally, a new menu "Sign up" was also tested. Process for these tests was similar to the one used in the first two usability tests.

Results of first usability test: Send money

Completed wireframes were tested for usability with 29 adults screened for numeracy. Results of a test of 'send money' are here (see Annex for more tests).



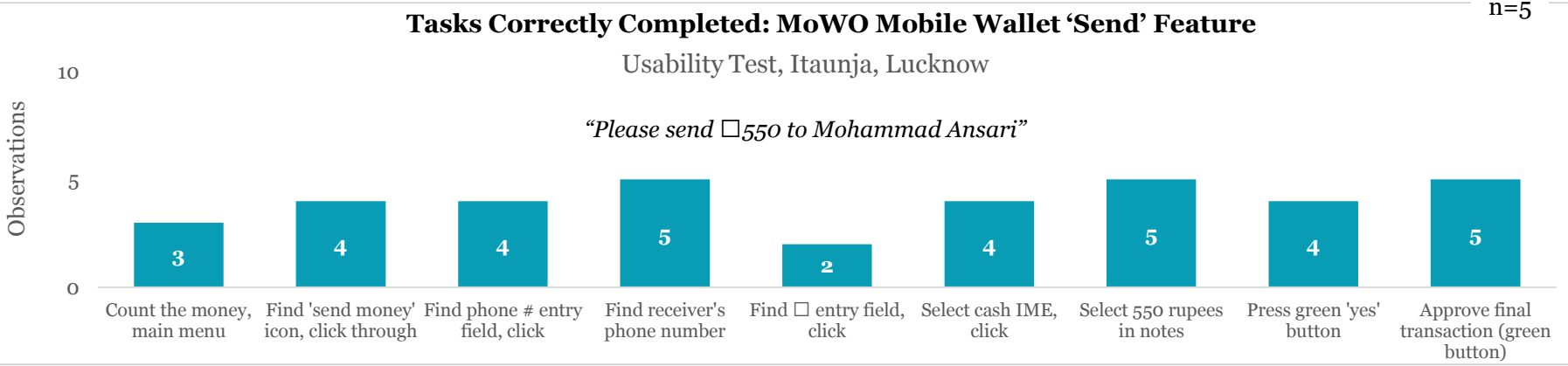
Observations

Of the 15 participants screened for numeracy test, 13 were found innumerate and 2 neo-numerate. Each received a 5-minute briefing on how to use the clickable prototype, completed from wireframes with Invision. While the test was reasonably successful, there was clear room for improvement:

- Finding the mobile phone number caused the most trouble, while selecting ☐550 in notes proved easiest.
- The 'send money' image developed during the project was well accepted, and 12 out of 15 people got it right in the first attempt.
- People had trouble finding the right fields to input mobile number, amount etc. **Thus, the input field can be shown in light green, while greying out the ones that are not yet salient**.
- People faced problem in identifying the number of notes they had selected, reflected in IME, through naked eyes. **Hence, a black border around all notes or a circle superimposed above the notes (since most of the respondents understand single digit number) will help them cross-check whether they have selected the correct amount in IME.**
- People found it easier to identify correct with green, hence, **the 'yes' tick should be green against a white background (not the reverse).**
- The black coloured home icon distracted people who felt it was being highlighted and hence, pressed it in the middle of the transaction. Thus the icon against which users have to enter the details should only be highlighted at a point in time.

Results of second usability test: Send money

n=5



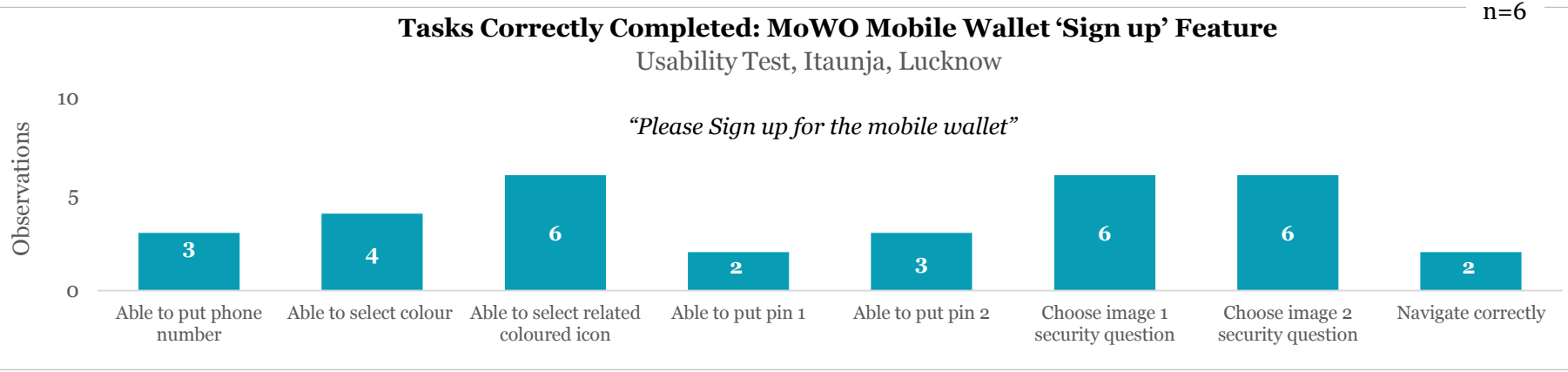
Observations

The result of the second test was quite similar to the first usability test.

- The mock demo video was an effective tool to teach people about transactions as was personal briefing.
- The average of the results score was better than the previous tests.
- However, in this usability test we found that participants found it hard to select the currencies in the cash based IME.

Results of third usability test: Sign up

n=6



Observations

The results of the 'sign up' usability test were:

- People understood the lock and key but could not relate it to 'sign up' process.
- People could remember icons which were related to them like saucepan and stew pot.
- All four females interviewed were not able to find the input fields in correct order and only remembered the security question as they could relate to the picture (of an utensil).
- Too many input fields in one screen confused the participants.
- Innumerate people faced difficulty entering the PIN. They remembered the PIN but were not able to enter the correct numbers.

6. Takeaways and Next Steps

Takeaways

Through multiple rounds of iterations and usability testing of wireframes, we have arrived at the following set of design features for MoWO:

Include elements you want users to learn (e.g. rupee symbol, 3+ digit numerals)

Create image alternatives for address book entries.

Support 3+ digit numerals with cash equivalents that users can easily count.

Field test oral icons for easy and instant comprehension.

Maximum of 5 core elements per page. Lots of white space!

Balance in wallet should be visible and clickable (for cash equivalent) at all times.

Cumulative user input visible and countable (cash and numeric modes).

Cash-based input method editor for safe user data-input.

Numeric input field should match cash inputs in real time, supporting user learning.

Numeric input method editor with cash image receipt to build user skills.

Next Steps

The research on Digital Wallet Adoption for Oral Segment helped *MicroSave* and My Oral Village gain deeper perspective on the behaviour of oral market segment in India.

- We conducted rapid prototyping of wireframes to come up with the design ideas of MoWO – Mobile Wallet for Oral. However, since testing is an evolving process, we will continue to conduct similar studies to enhance the look and feel of MoWO and include increased number of transactions.
- The payment landscape in India has been witnessing a paradigm change, further accentuated by new innovations. New mobile applications has been rapidly developing and MoWO can be modified depending on the service offerings of FSPs.
- We will also conduct similar studies for oral segment across various geographies.

In the following two slides, we have listed a set of guidelines for FSPs who would like to design their own version of MoWO.

Guidelines for FSPs (1/2)

Oralised mobile wallets should use the following design principles and practices:

- Maximise oral usability, guessability, learnability and re-usability: Field evidence suggests that cash-based counting and calculation systems can contribute significantly.
- Provide positive incentives to acquire numeracy/ financial literacy skills: Place-value notation is a major constraint for the oral clients and a cash-based input method editor can improve incentives.

Target early adopters first to gain acceptance among the oral section. This includes:

- Adults in the 26-35 age group.
- Technology adopters, such as adults who use calculators, calendars and address books on their phones.
- Individuals pre-committed to adapting to the financial system, such as merchants and vendors, SHG, JLG and savings group members.

For the oral segment use of payments is the cognitive gateway to the use of other financial services. Managing cash as a digital store of value is a huge additional leap. To address digital savings, and support improved understanding and use of digital credit, suppliers must address oral concerns about literate measures of time and economic value.

- An open-source library of oral icons, addressing the full range of digital financial services, should be developed for India.
- It should also include models for oral content hierarchies, transactional process flows, and time measures.
- Oral information management solutions can be used beyond digital finance, such as in retail microfinance and banking transactions. For example, these principles and practices can also be applied to paper-based interfaces, microcredit contracts, cash receipts, ATM and POS designs, etc.

Guidelines for FSPs (2/2)

The oral segment should be treated as separate and distinct in digital financial services.

- On-boarding and product use patterns should be tracked separately from other segments.
- Evidence of literacy should not be used as proxy for evidence of numeracy in India.

The oral segment should be operationalised with reference to their personal capabilities.

- Suppliers should utilise consistent measures of capability, based on empirical testing systems and geared to their segmentation and product strategies.
- Suppliers should build on their findings to leverage the distinctive capabilities and practices of the oral segment.

The oral segment is deterred from using mobile money applications by low context and high stress. There are several low-cost tactics suppliers can use to alleviate this effect.

- Include an off-line 'sandbox' at the front gate of every mobile money application, motivating users to fully explore all transactions on offer using play money.
- Agents can also provide spaces in their facilities where their customers can use play money to support calculations and conduct real-world tests of applications.
- Limit time-pressure on the user in every way practical – for example by permitting some functions to take place off-line.

Low context: much information is being transmitted to this population segment in codes they cannot decipher.

7. Annexure

Methodology

Research Design:

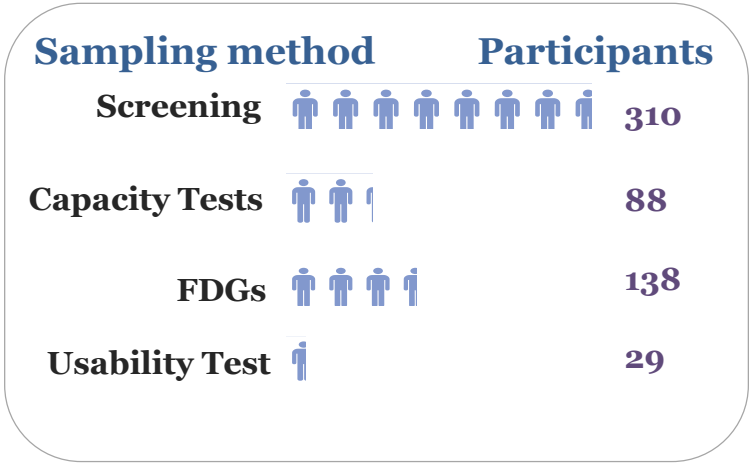
This was an exploratory research that included data collection for potential mobile wallet users, rapid prototyping and usability testing.

Research Tools:

The study was done using quantitative and qualitative research tools i.e. screenings, capacity tests and focus discussion groups . On-field usability test of the design was also conducted.

Geographical Spread:

Field work took place between Oct 3-28, 2016 in three Indian states: Uttar Pradesh, Punjab and Bihar. Usability of the design was field-tested over a period of time (Oct 30th, Nov 9th and 18th) in Bihar and Uttar Pradesh.



Screening:
Participants were selected from within target communities through personal referral, community leaders or MFIs. All participants were segmented into three levels in terms of literacy and numeracy skills using a quick screening.

Capacity Test:
A core sample of 88 people, drawn from the main screening sample, was interviewed for 45-60 minutes and data was collected on their numeracy capabilities. Only individuals who were not fully numerate were included.

Focus Discussion Groups:
FDGs were conducted with individuals from diverse background with different literacy levels to gain insights into the mobile wallet design interface; literates were not combined with illiterates. Oral icons and design devices were tested for usability, learnability and guessability.

Usability Test:
The usability of the completed OIM drafts was field-tested among oral people to assess overall usability, learnability and guessability.

7.1 Field Observations - Supplementary

Screening

Assessment of signing, reading and numeracy capabilities.

Capacity Test

Quantitative research conducted to understand oral population's relationship with counting, calculations and money.

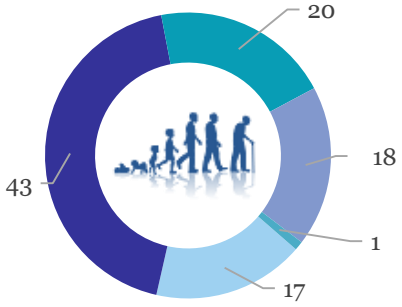
Focus Discussion Groups

Qualitative Research conducted to develop and test wireframe designs of mobile wallet.

Sampling details

Please Note: *'Others' include various self-employed people such as, fruit and vegetable vendors, seamstresses, tailors, phulkari workers, mechanic and mason.*

Age-Group (%)

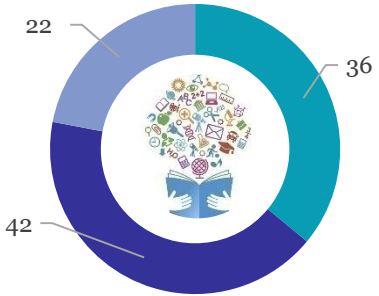


n = 88

Female 56%

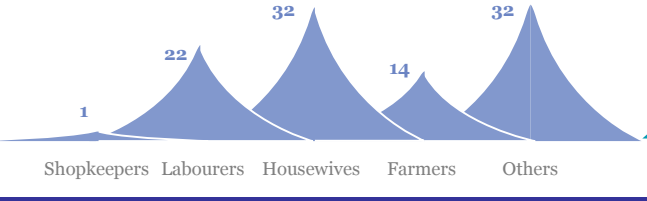
Male 44%

Education (%)

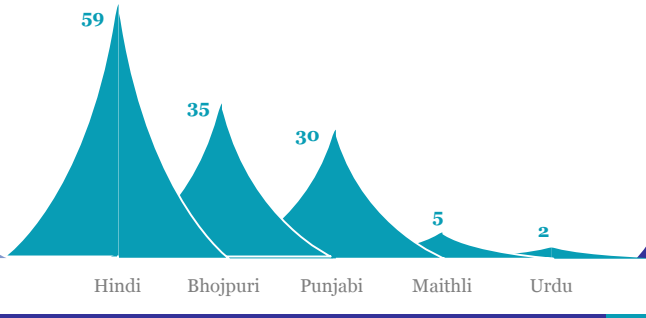


Please Note: *'Others' include various insurance schemes, such as LIC; small deposits done with Sahara or chit fund companies.*

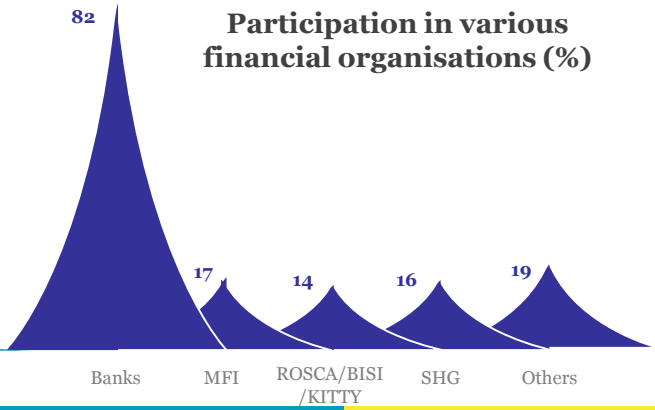
Occupation (%)



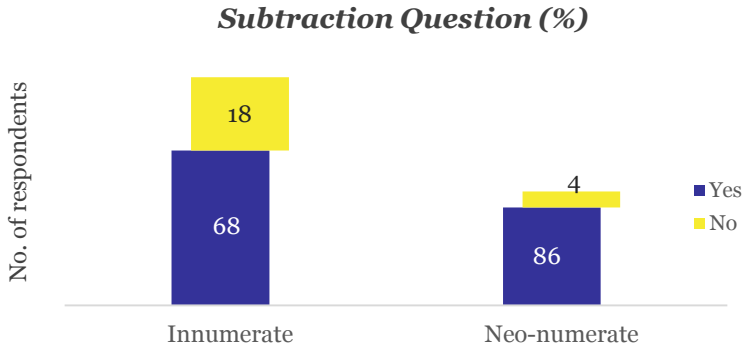
Language that the respondent speaks at home (%)

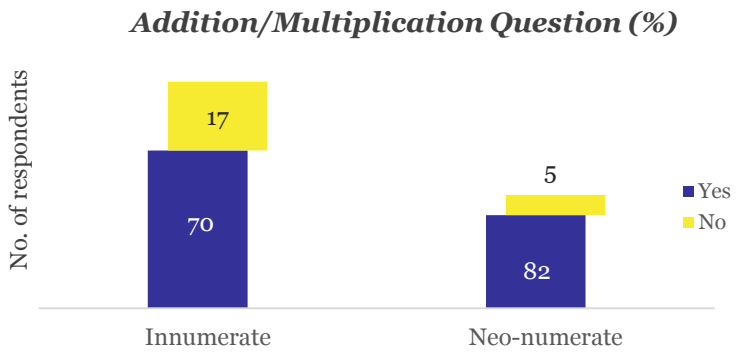


Participation in various financial organisations (%)



Oral understanding of calculations and numbers (1/2)





Subtraction Question: *You are in the market on Saturday morning, and you wish to buy a bag of rice from the shop that costs ☐780. How much change should you get from ☐1,000?*

Most people answered correctly after calculating mentally. A frequent incorrect answer was '320', resulting from subtracting 700 from 1,000 and getting 300. A few people estimated the result was close to 200, or 300 but were unable to continue.

A few people succeeded when they were offered to cash to help them calculate. The currency gave them a familiar visualisation of the numbers, thereby helping them get to the answer.

Addition/Multiplication Question: *Your bank charges you ☐25 for every ☐ 1,000 you transfer from your account. How much would you be charged if you want to send ☐5,000?*

Most people answered correctly by processing the data mentally. Incorrect answers ranged from 75 up to 500.

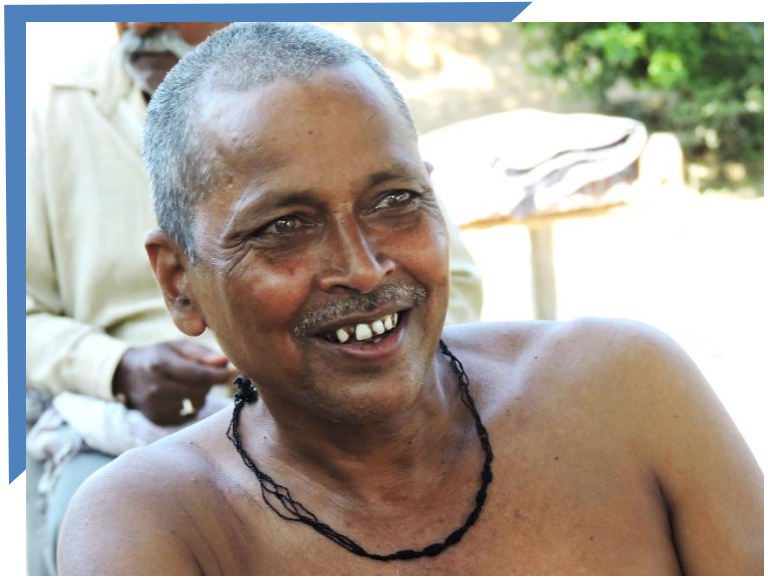
The 25 who could not answer correctly were offered cash notes to re-calculate. Fourteen succeeded after receiving this cue.

For this calculation, *cash functioned as an oral 'calculator' for a population who can not or will not use the calculators on their phones.*

Case study on mental calculation: Addition and subtraction

Case Study #2: Ravi from Jitwarpur Village, Bihar

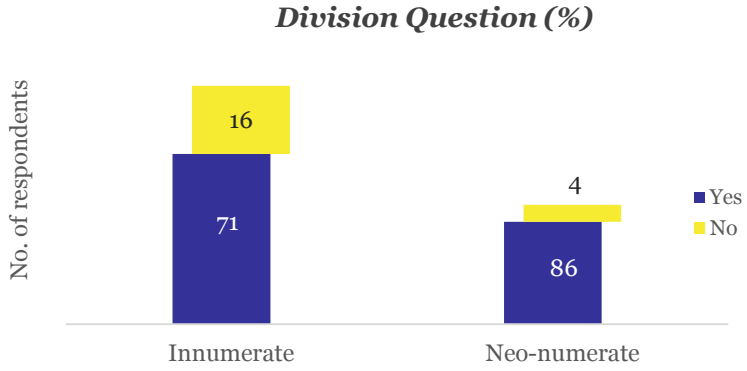
Ravi is a 45-year old farmer who lives in a joint family with his wife and children. He is illiterate and innumerate, and relies on his educated younger brother for all daily calculations for household and agri-input purchase purposes.

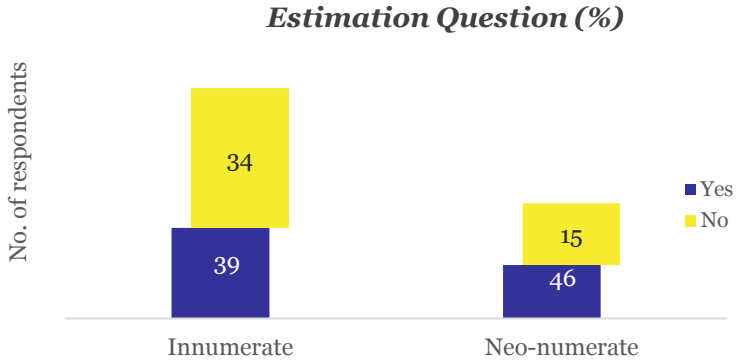


In due course of the capacity test, he was asked that if he shopped for ☐780 and handed the shopkeeper ☐1000 how much change should he get back. He had little trouble with subtraction so Ravi added ☐20 to his bill amount and came up to ☐800 which is ☐200 shy of the amount tendered. Thus, he answered ☐220 which was correct.

However, when asked how much commission he would have to pay to transfer ☐5000 if the bank charged ☐25 per ☐1000, he could not calculate the amount. Even adding ☐25 five times was a difficult task. When handed the wad of notes of mixed denominations, he was initially hesitant assuming that there were not enough notes to make five separate stacks of ☐25. Once he realised there were enough currency notes to make five stacks, Ravi gave the right answer. His mental calculation capability was entwined with his practical everyday money management. Outside of this ambit, cash in hand gave him a visual of the numbers which aided him to give the correct answer.

Oral understanding of calculations and numbers (2/2)





Division Question: *You have set a goal of saving ☐50,000 in 5 years. How much do you have to save each* ***year*** *to reach your goal?*

Perhaps counter-intuitively, this division question had the highest accuracy rate of any of the seven questions, especially with the innumerate. Failure was mostly not due to answering wrong but due to a characteristically oral inability to respond to a hypothetical scenario viewed as impossible. ("In our family, it is impossible to save this much.") However, when explained the hypothetical nature of the question most were able to answer correctly. Cash did not help people to answer this question.

Estimation Question: *You have set a goal of saving ☐50,000 in 5 years. How much do you have to save each* ***month*** *to reach your goal?*

The accurate answer was ☐833.3 but any estimate between 750 and 900 was accepted as correct.

Considering the difficulty of this question, performance was good. In spite the level of difficulty, results showed the least performance variance between innumerate and neo-numerate respondents.

Case study on mental calculation: Division

Case Study #3: Gita from Siswan Village, Varanasi

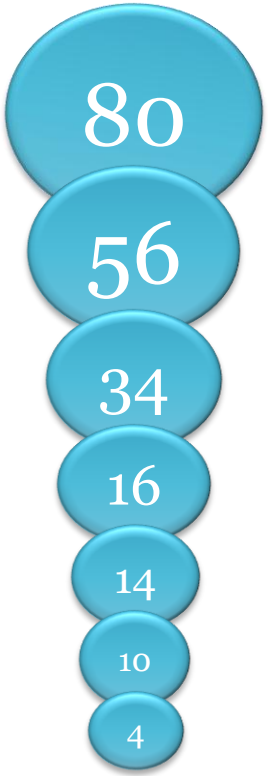
Gita is a 32-year old housewife. She has a banana tree and a guava tree in her plot of land. She plucks the fruits from these trees and hands it over to her husband, who then sells them in the market. She has 5 children, all of whom are girls. She wanted to educate her children and has admitted them in school. She herself used to go to school but when she was in standard II her teacher hit her on the palm with a scale. After this incident, she discontinued going to school but now she regrets not being educated.

Gita is inquisitive to learn numeracy skills, which her children have already learnt in school. “Given my relationship with numbers, if I have the right opportunity I’ll be able to calculate in a better way.”
She was able to answer the division (goal of saving ☐50,000 in 5 years) question easily and got to ☐10,000. When asked the month (goal of saving ☐50,000 in 5 years) question she started calculated day-wise.

- “If I save ☐40 a day I’ll save about ☐1,200 a month.” She added the months together to get to and in a year ☐15,000 a year. She realised this was too large a number.
- “If I save ☐30 it might be better, say ☐900 a month.” She realised it was still large, as it added to ☐10,800 per year.
- She then estimated that she would have to save ☐800 a month.

Oral adoption to mobile technology

Oral people who have on an average more number of years of schooling are able to conduct more advanced activities on the feature phone, such as sending SMS and creating address book entry, than those who have on an average less number of years of schooling. Oral people with less education are hence, unable to use text-heavy digital wallets.

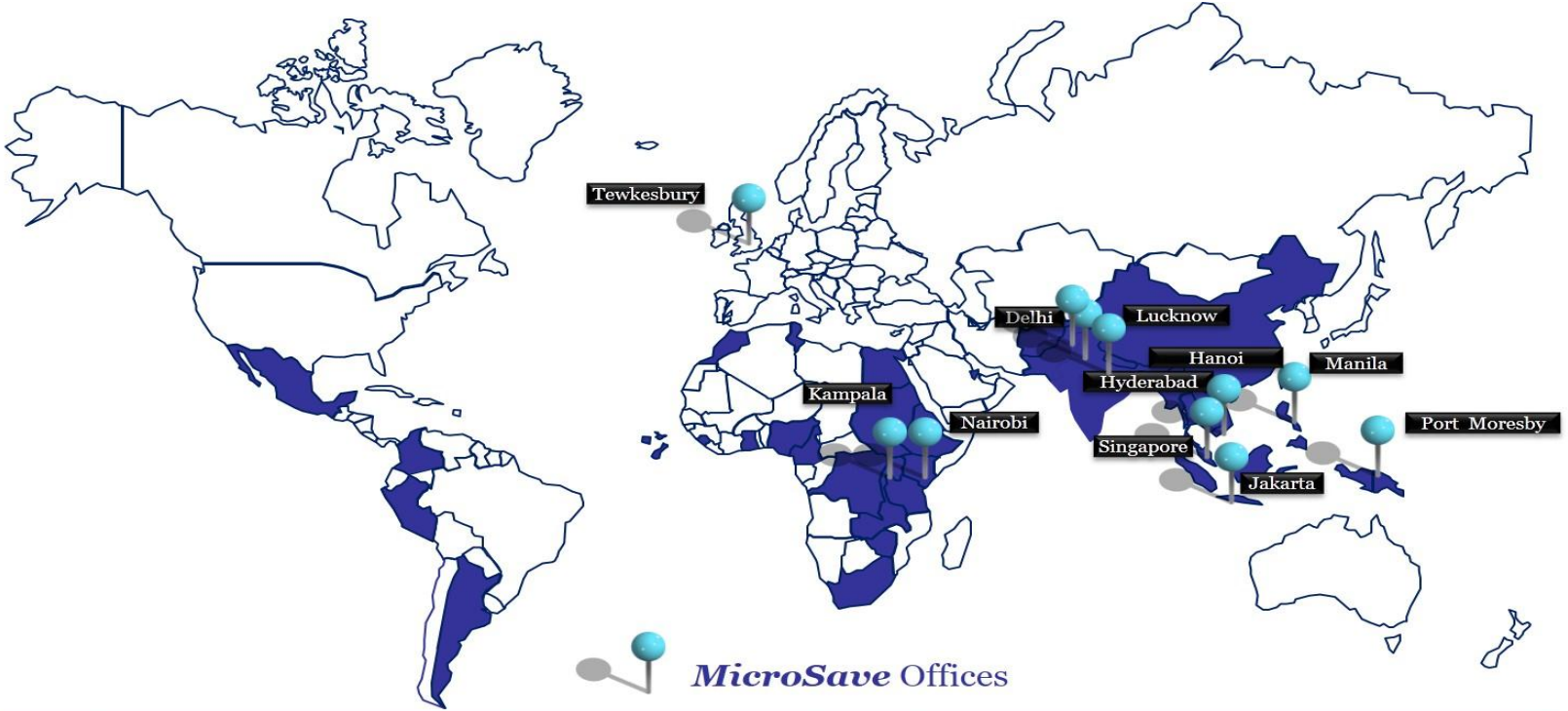


	Average no. of years of schooling	Average Age	Average of mental calculation indicator
Can accept calls	3.2	35.8	4.2
Can initiate calls	4.2	33.1	4.4
Look-up address book	5.5	30.3	4.5
Create address book entry	8.3	26.7	4.8
Read SMS	7.1	29.4	5.0
Use calculator	6.7	28.5	5.3
Send SMS	9.5	23.0	4.8

About *MicroSave* and My Oral Village

MicroSave is a leading international consulting firm that offers practical, market-led solutions focused on enhancing access to financial services to the low and middle-income segments. Our inspiration is to live in a world in which all people have access to high-quality, affordable, market-led financial services and other support they need. In this context, we have been working with our clients for nearly two decades as a local international consulting firm on guiding policy & facilitating partnerships to develop enabling eco-systems, providing comprehensive, customised strategic advice and delivering actionable, on-site operational assistance in financial & social inclusion. We enable financial institutions to adopt a client-centric approach to serve their target markets.

My Oral Village is a social enterprise working at the oral-digital frontier to build trusted, usable financial solutions for economically active adults with low literacy and numeracy capabilities. We deliver digital and paper-based interface designs, software solutions, consulting and research services, and hands-on capacity building services to financial services providers world-wide.



India Head Office:
Lucknow
Tel: +91-522-2335734
Fax: +91-522-4063773
New Delhi Office:
Tel: +91-11-41055537/38
Hyderabad Office:
Tel: +91-40-23516140

Kenya Office
Shelter Afrique House,
Mamlaka Road,
P.O. Box 76436, Yaya
00508, Nairobi, Kenya.
Tel: +254-20-2724801/2724806
Fax: +254-20-2720133

Uganda Office
Ntinda Ministers Village
Plot 27, Valley Drive
P.O. Box 29111
Kampala, Uganda.
Phone +256-393 202342
Mobile: +256-706 842368

UK Office
The Folly, Watledge Close,
Tewkesbury,
Gloucestershire
GL20 5RJ, UK
Tel. +44 1684-273729
Mobile +44 796-307 7479

Philippines Office
Unit 2408,The Trade and Financial Tower,
7th Avenue Cornner,
32nd Street, Bonfacio Global City, Taguig City 1634, Metro Manila, Philippines.
Tel: +(632) 477-5740

Indonesia Office
ANZ Tower 23rd Floor, JI. Jend. Sudirman Kav. 33A,
Jakarta Pusat 10210, Indonesia.
Tel:+62 21 2954 6828/29 fax: +62 21 2954 6889

PNG Office
Corner of Musgrave Street and Champion Parade,
Port Moresby, Papua New Guinea.
TeleFax No.: +675 321 8823/321 8854

Singapore Office
3, Shenton Way, #13-06, Shenton House,
Singapore (068805)
Tel:+65 673 47955

Contact us at *Info@MicroSave.net*