My Oral Village

Roadsigns Project

Usability Testing

for GNU Taler 'with OIM Inside'

Freetown, Sierra Leone

May 2025

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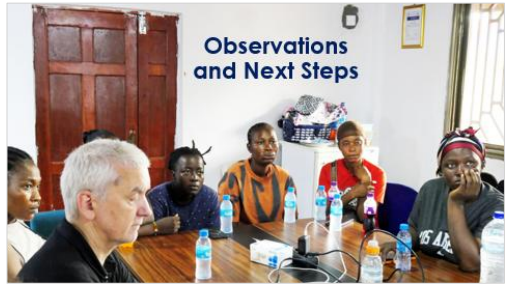

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89 SLE

Overview

‘Roadsigns’ OIM Testing for Mobile Money

Project Title: ‘Road Signs for Digital Payments’

Funder: Stichting NLnet

Creative Agent: My Oral Village, a Toronto-Based social enterprise.

Funding Purpose: work towards creating safe, usable financial interfaces for poorly-schooled adults, as free and open source building blocks offering the right to all to use and repurpose part or whole without restrictions.

Collaborating Partner: Taler Systems, a Luxembourg-Based social enterprise.

Project Goal: To develop a system for checking savings balances and sending money using GNU Taler, a FOSS payment that does not depend on literacy (analogous to Europe’s iconographic road signs).

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Project Roles

Organization	Roles
My Oral Village	Lead the OIM research and innovation processes.
Taler Systems	Advise on all relevant aspects of GNU Taler, prepare and refine software builds, test OIM frontiers for smart phones.
New Salone Woman Organization	Recruit participants, interpret participant reactions, advise on local meaning and motivation.
New Salone Design Company	Prepare locally meaningful and motivating OIM designs.

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Testing Segment and Process

Women participating in a separate (SOL) project who as a group demonstrate very low levels of numerical literacy (ability to read multi-digit numbers) were invited to the office of the New Salone Woman Organization in Freetown.

1. Set participant expectations. No payment mentioned.
2. Test basic numeracy and literacy of each participant.
3. [Same day] Orient participants together on the OIM Taler app, with projector. One woman was oriented privately on a phone.
4. [Next day] Ask participants to perform tasks on an iOS smartphone corresponding to the orientation. All questions were fair, but no assistance was provided in decoding the interface.
5. Conduct a 30-minute follow-up survey.
6. Pay each participant 200 NLe.

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Two Testing Stages

User testing was conducted twice:

1. May 2-3 (8 participants) and
2. May 9-10 (13 participants) .

During each stage orientation took place the first day, followed by testing the second day.

- ✓ One participant who first arrived on May 3 and was oriented rapidly on a smartphone was not tested until May 12, providing a particularly rigorous test.

Substantial changes in the design, based on user feedback, were implemented between Stage 1 and Stage 2.

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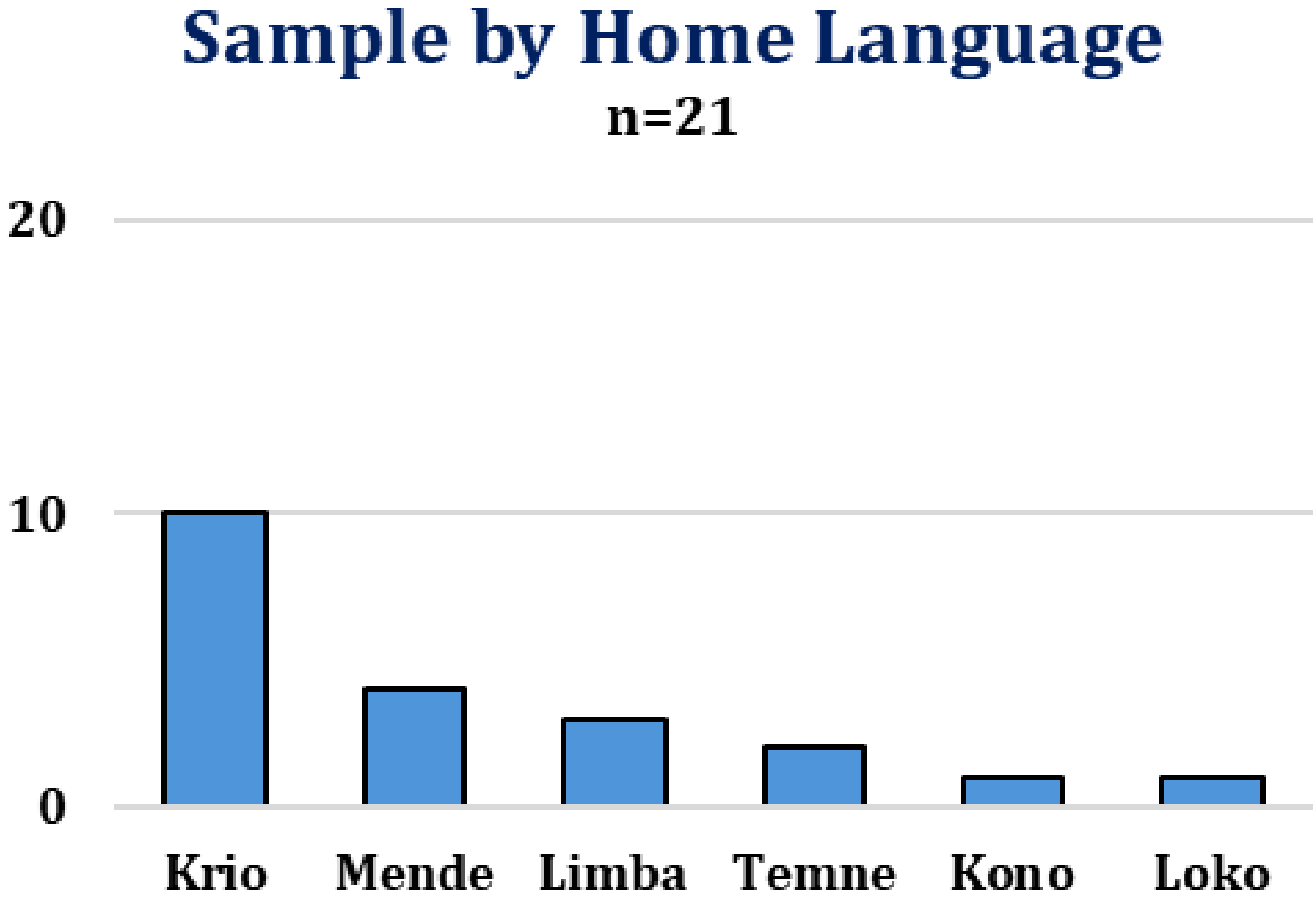
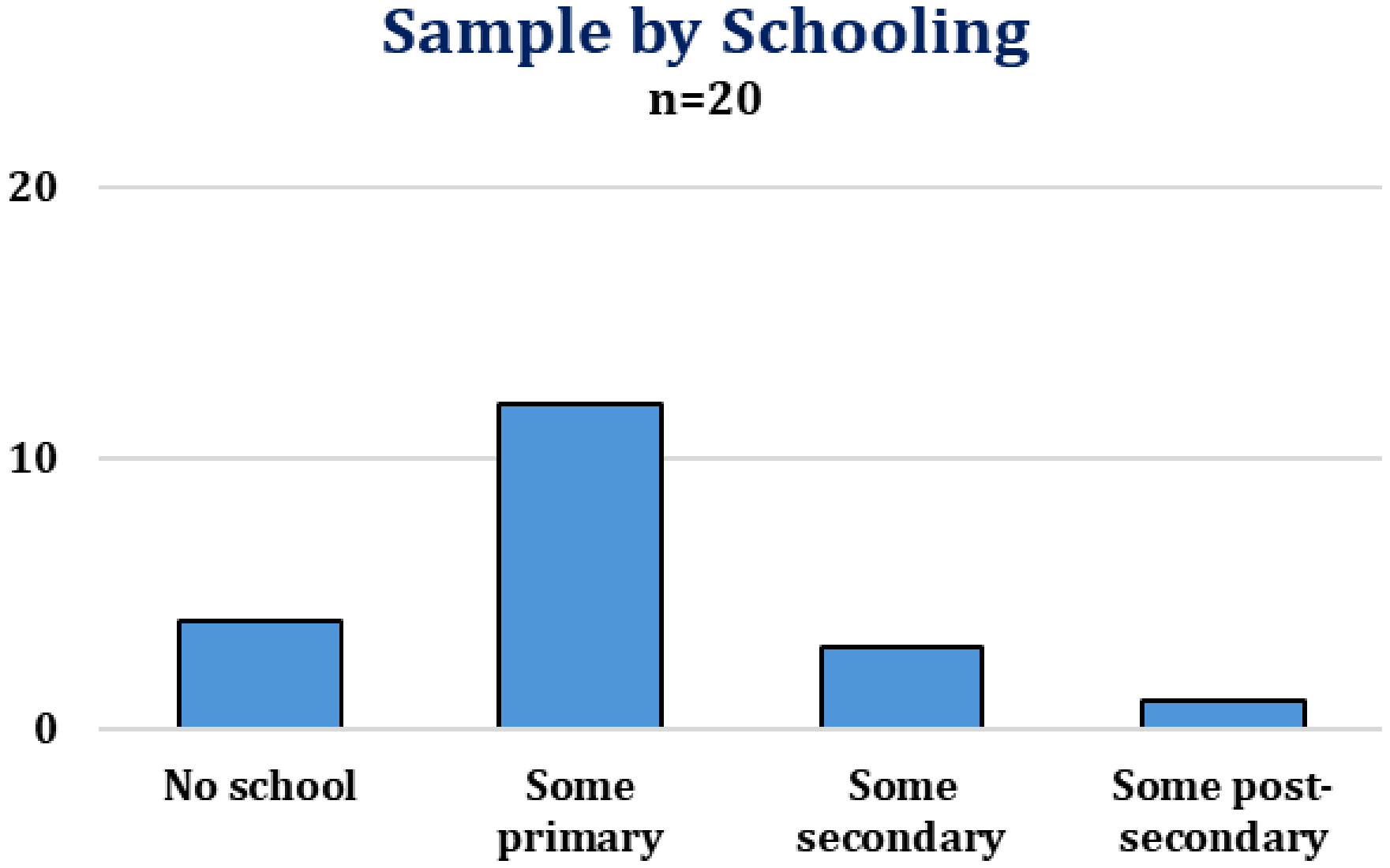
The Sample

While Krio is the national language of Sierra Leone, the nation has 16 indigenous languages. Freetown is the economic heartland and a magnet for internal migration. All participants could speak Krio, and all proceedings were conducted in Krio.



All participants are currently in a program where they are in the process of securing a license to drive ‘keke’ (auto rickshaw).



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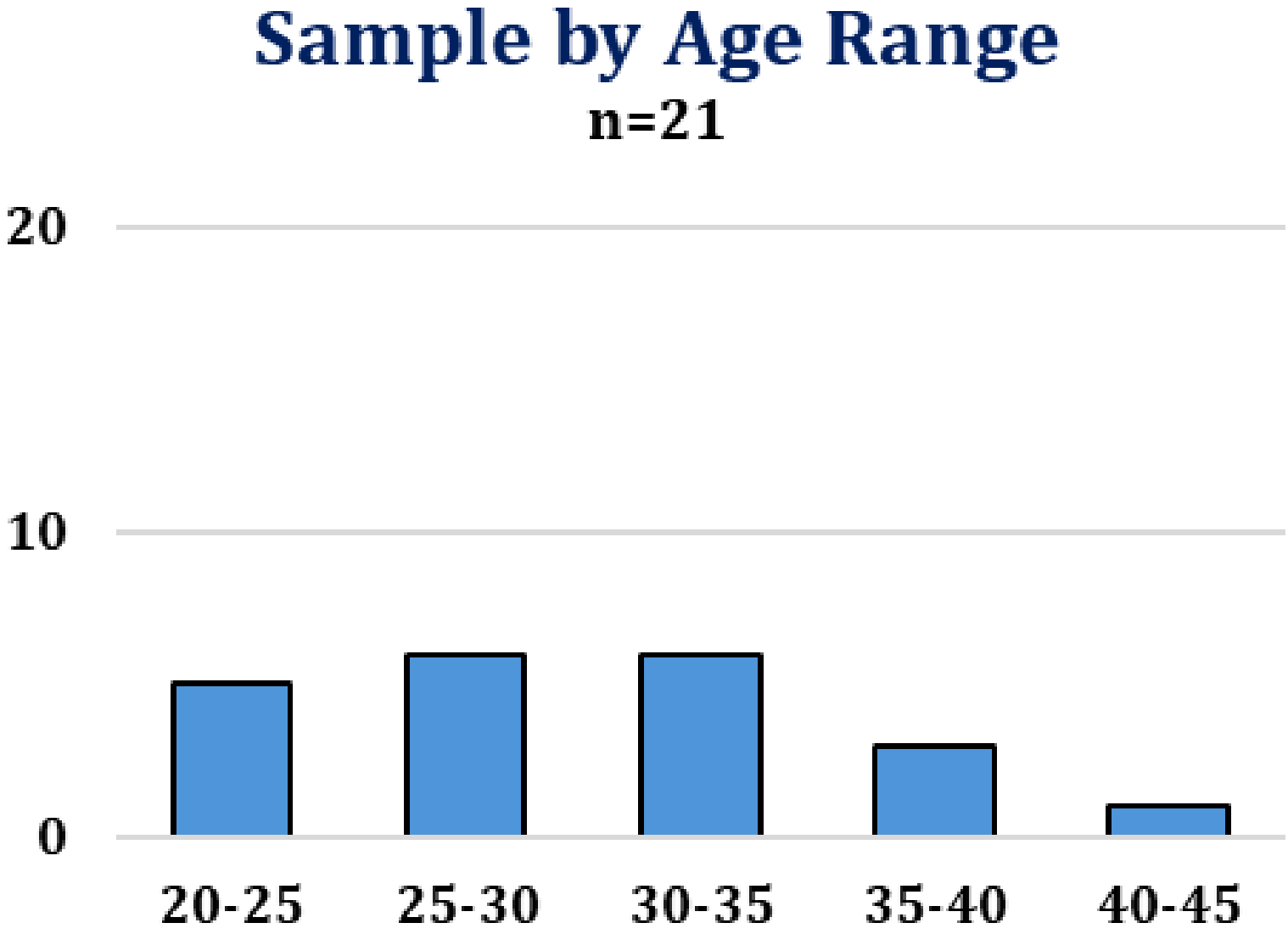
Driving keke is a common livelihood path for men in Freetown, but much less common for women. It will require them to learn to read a fuel gauge, speed metre, etc.



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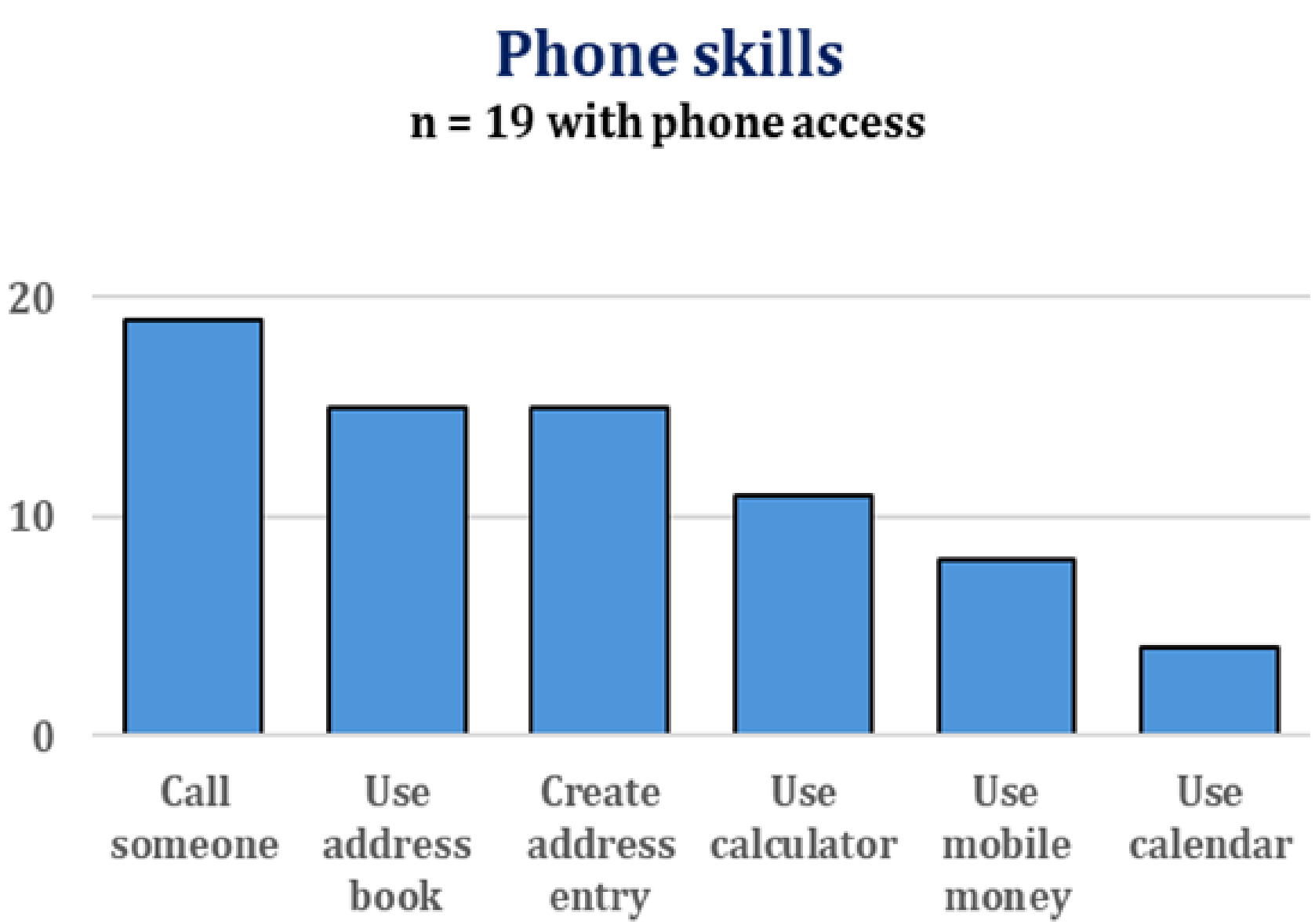
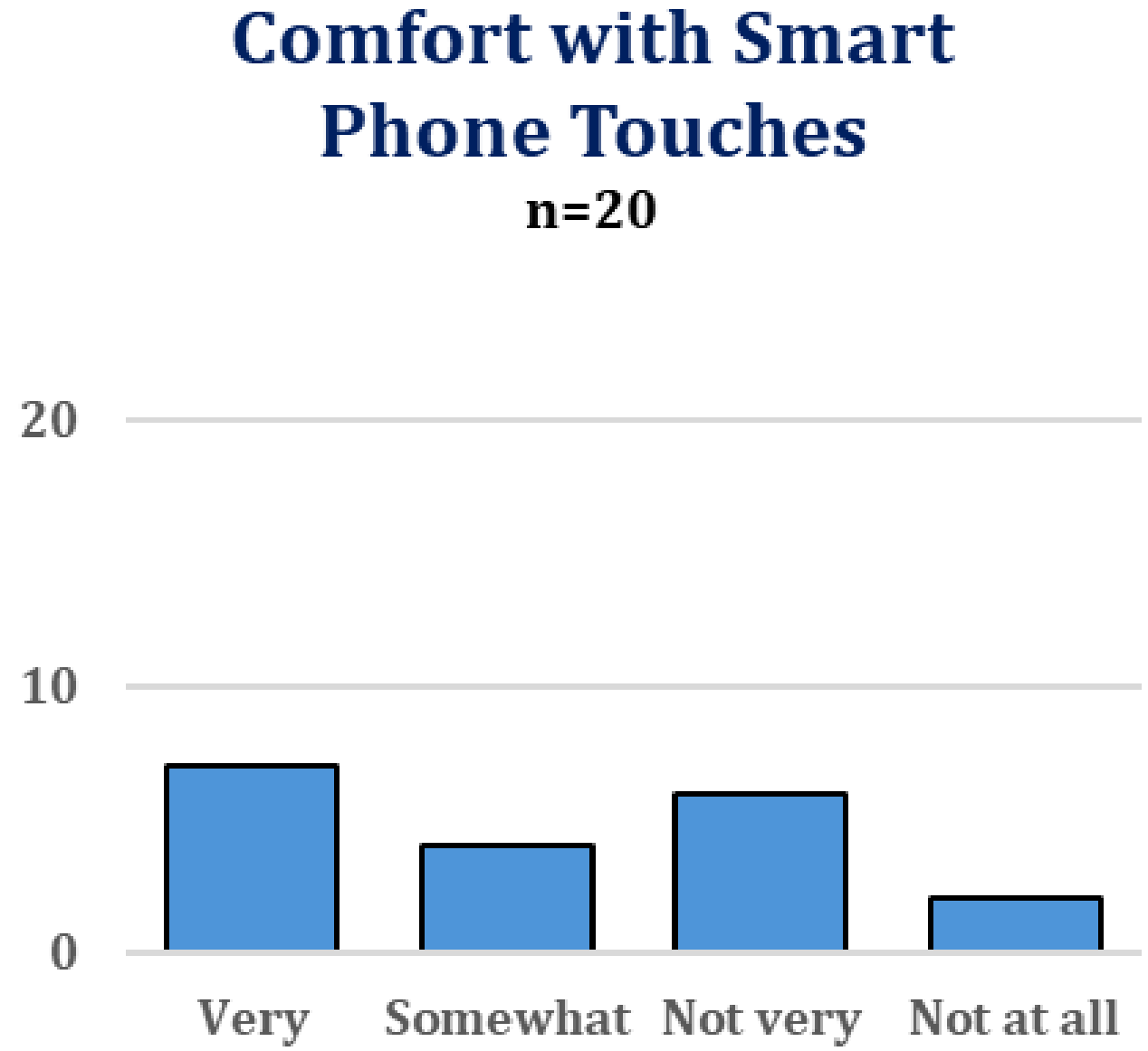
Out of 21 participants 19 owned (or had previously owned) a smart phone.



Self-ascribed digital fluency varied widely, with some respondents saying they were ‘very’ comfortable with the gestures and touches needed for mobile money, while others expressed strong reservations.



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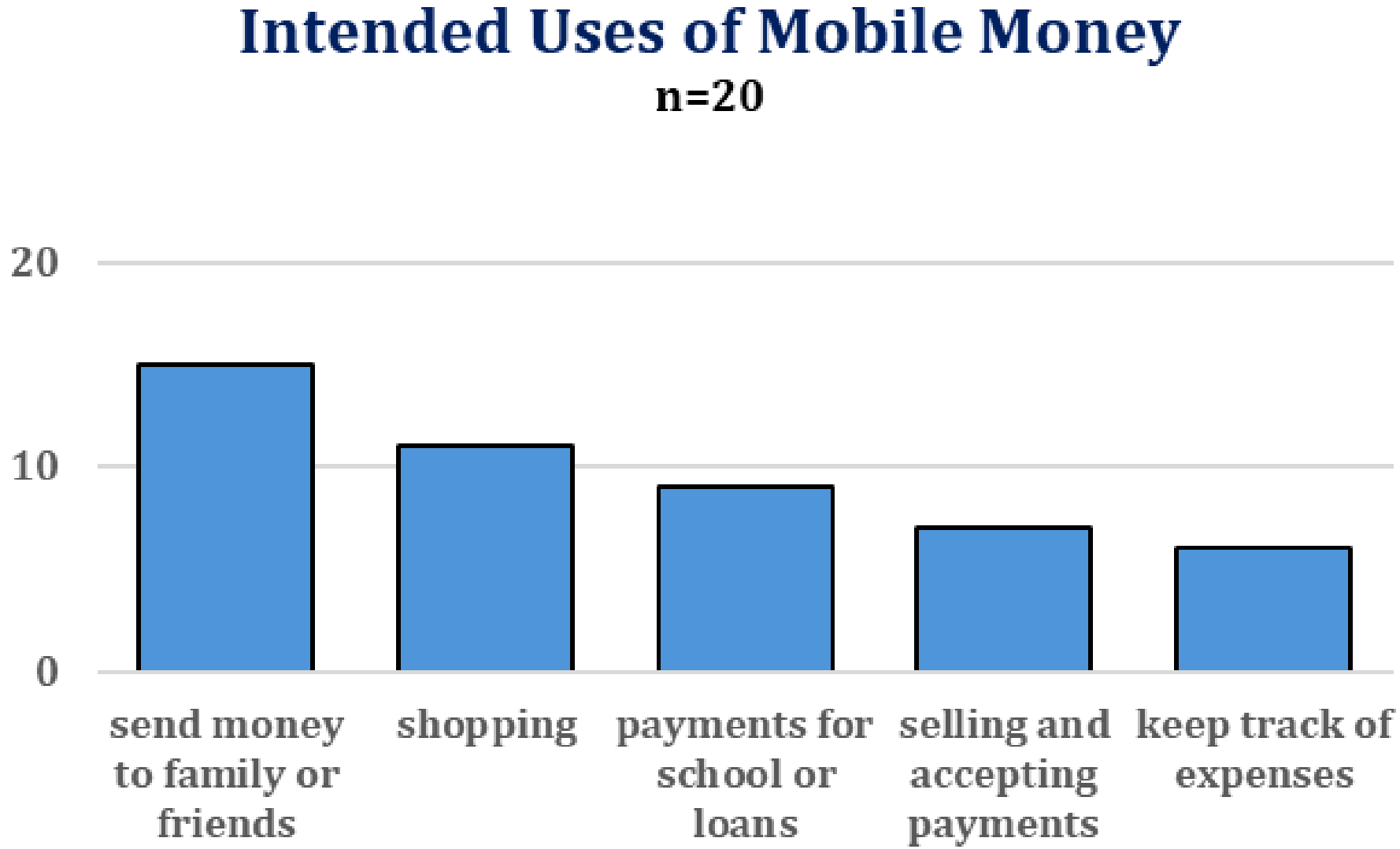
While only 8 of the participants stated that they currently use mobile money, most of the others had a basic grasp of what it was, and how it might be used. They also had views about how they would use it if they had it.



Numeracy and Literacy Testing

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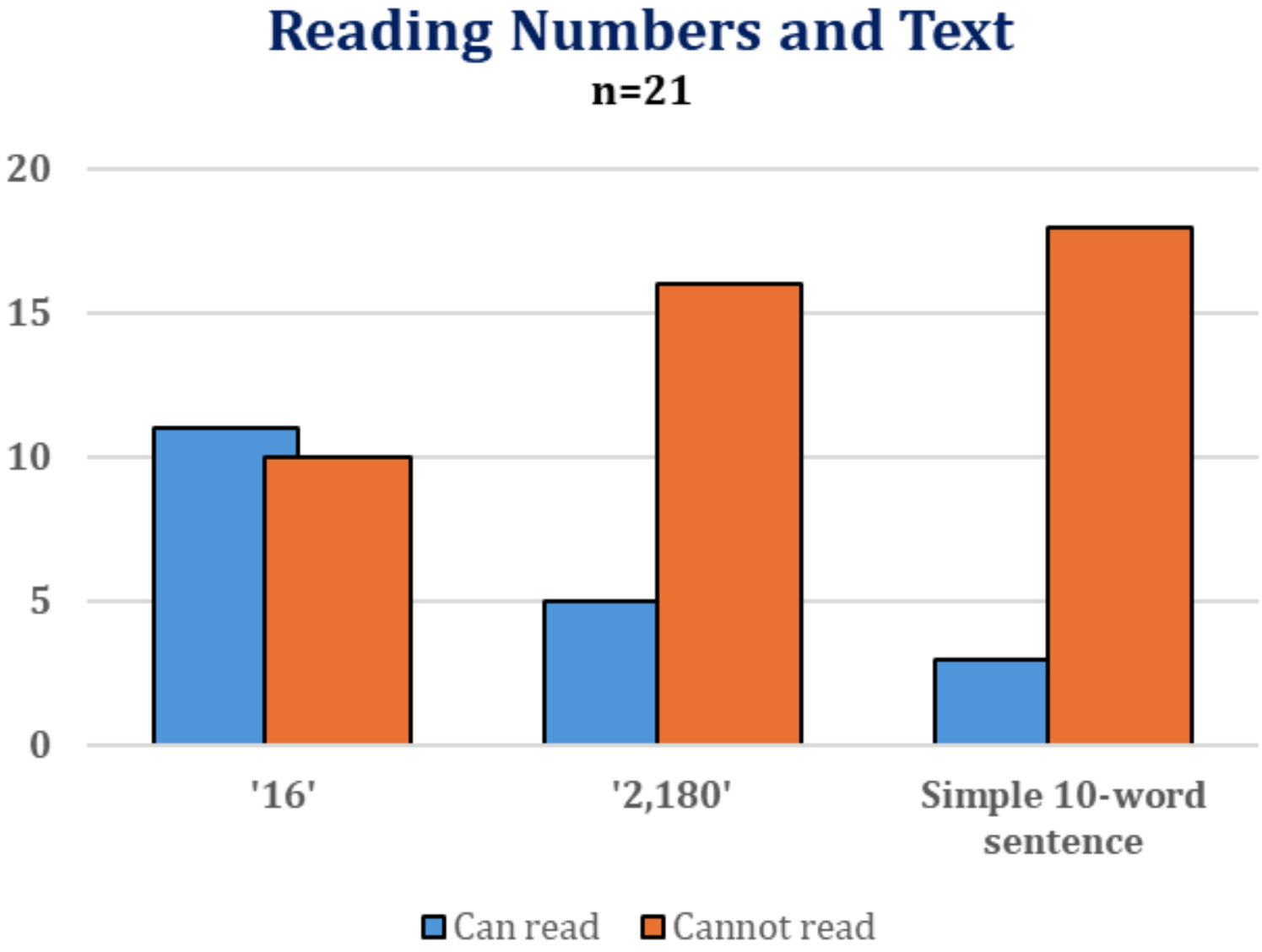
Before the Testing
participants were asked to read this sentence:

“Today I bought a bicycle for 2,180 NLe and fruit for 16 NLe.”

This test measures three skills:
* ability to read the 2-digit number (‘sixteen’, not ‘one, six’);
* ability to read the 4-digit number (‘two-thousand, one hundred and eighty’);
* ability to read the words with understanding (not sound out the letters).



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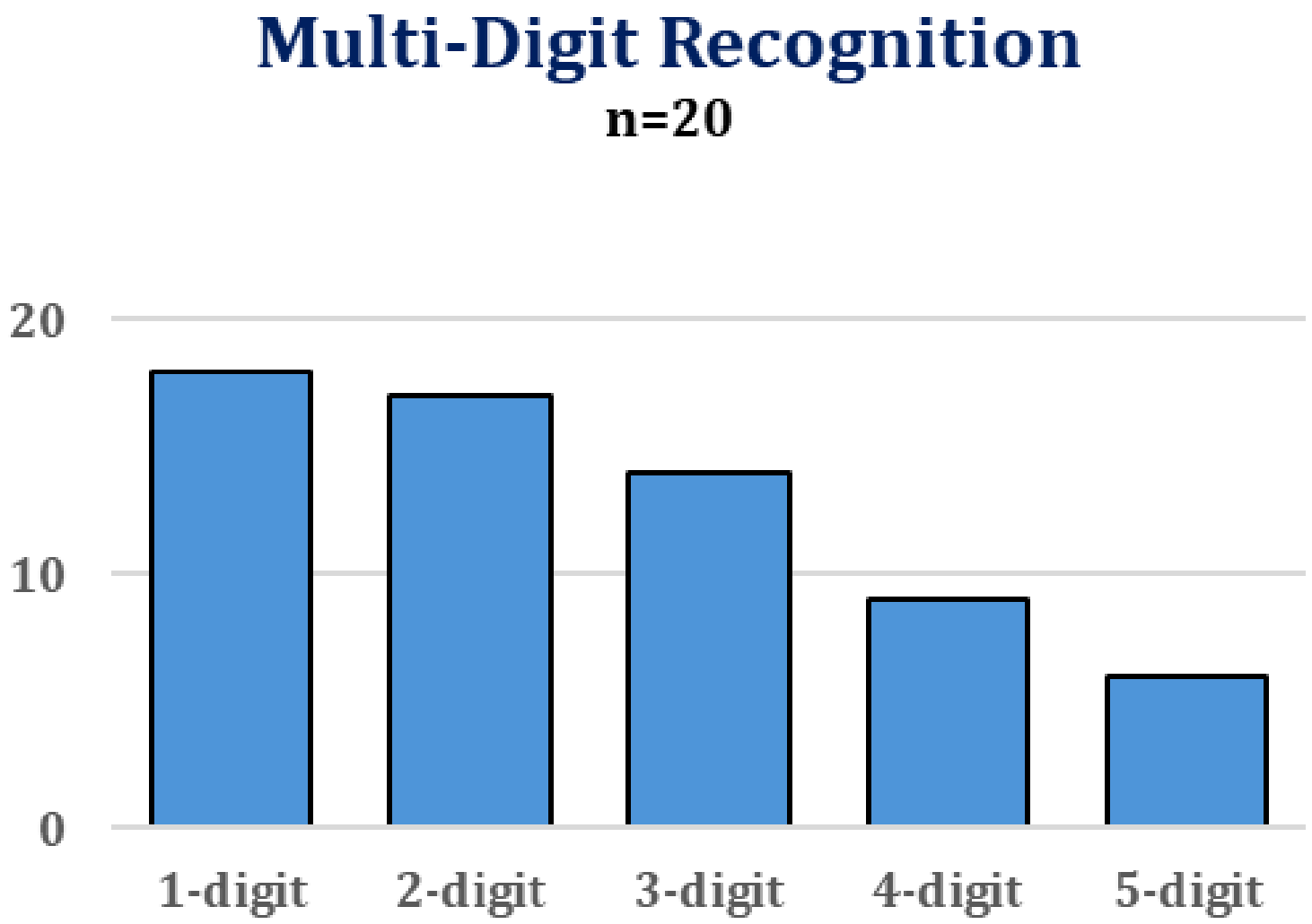
After the testing participants were asked to read a series of 15 ordinal numbers, ranging from 1-5 digits in length.

The ability to do this declines as the length of the digit string increases. A small improvement in 2-digit and 4-digit ability was observed during the test



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Orientation to OIM Taler Interface

Orientation

Orientation was conducted by projecting the interface onto the wall of the NSWO office and explaining each of the icons to participants in Krio, their common language. Questions were answered at the end.

During Stage 1 the orientation took 30 minutes. In Stage 2 this was reduced to 15 minutes, excluding questions about the app that were unrelated to interface navigation, taken at the end.

89 SLE

50
39 SLE

Usability Testing

Stage 1 Test

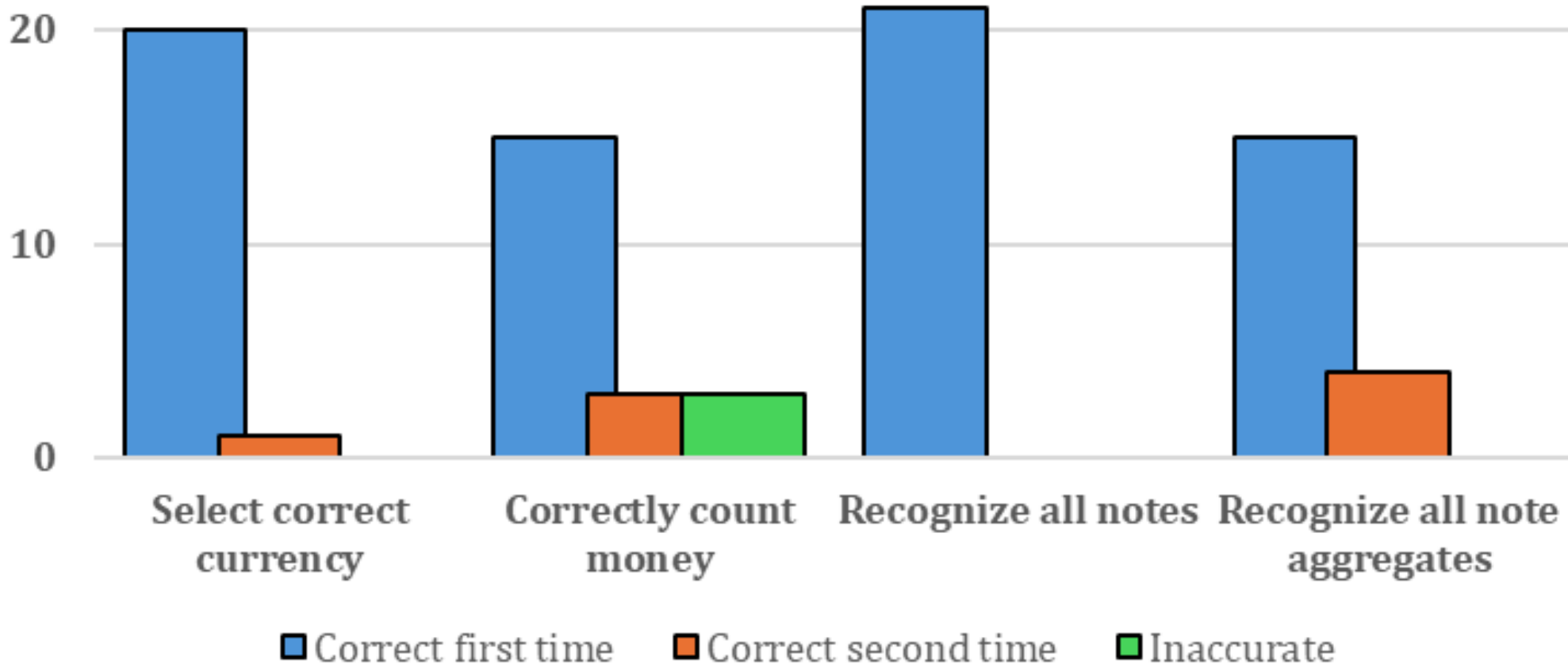
Interface included Euro and New Leone (NLe) currency options. Currency images depicted notes, coins, or aggregate sums (larger than any bill). Featuring:

- ✓ **introductory page** to select Euro or NLe;
- ✓ **balance page** showing a fixed sum (25 NLe) in the user's wallet, displayed on a counting table, with a place value counter and abstract 'send money' icon on upper right;
- ✓ **calculation page** where the user selects available sums from cash scrollbar on bottom of screen and removes them from counting table by tapping, with place value counter and payment goal icon on upper right (sums auto-aggregate using animation); and
- ✓ **payment purpose page** where icons for five common purposes were displayed with send money icon highlighted in red on upper right.

Users were asked to send a random sum < 25 for one of 5 purposes.

Testing Results (Steps 1-4)

n=21



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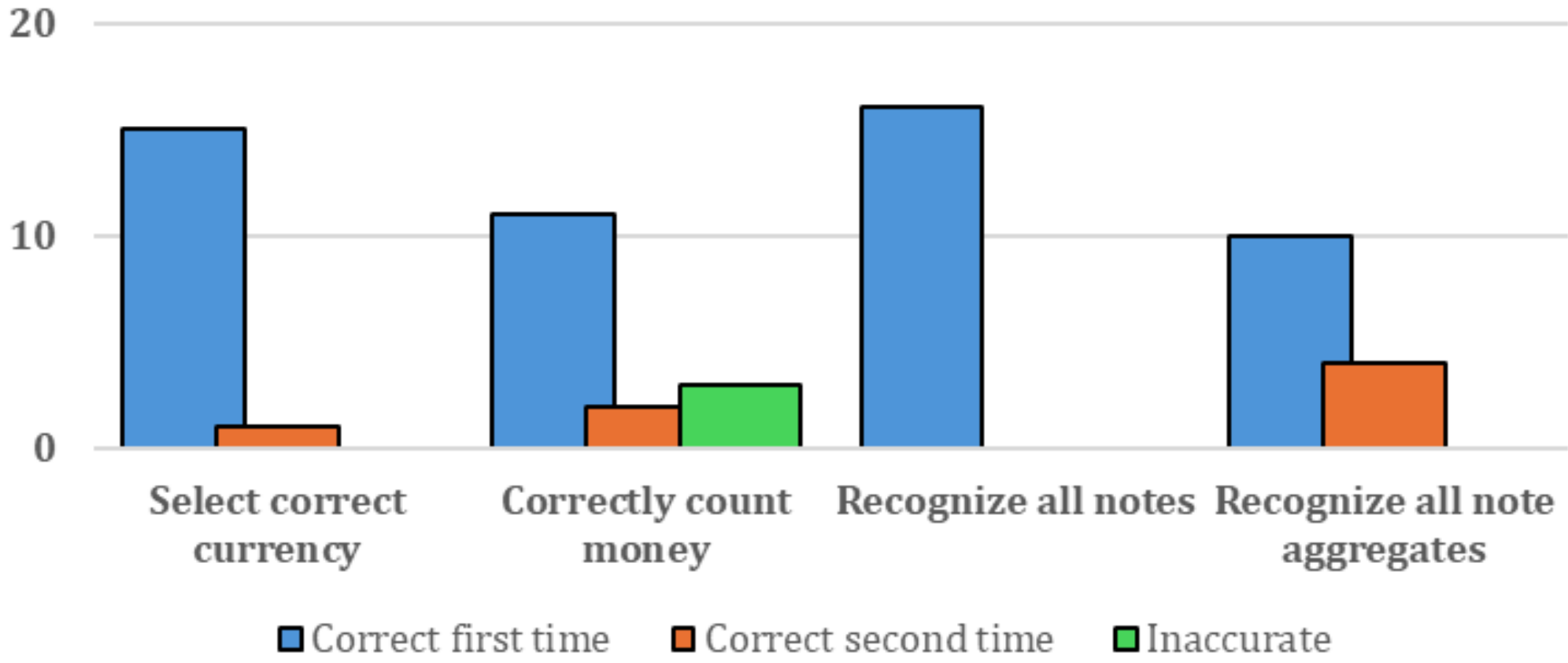
Testing, Steps 1-4 (Low Numeracy)

n=16



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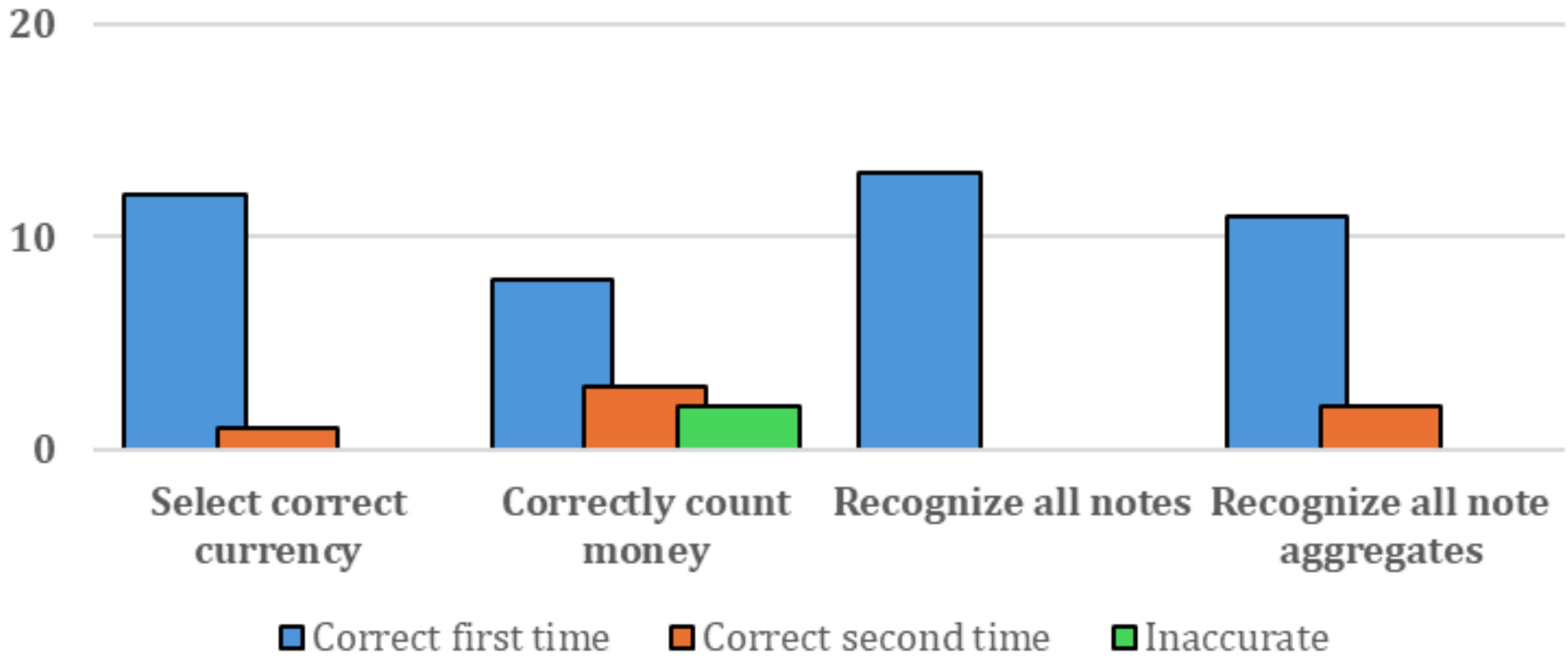
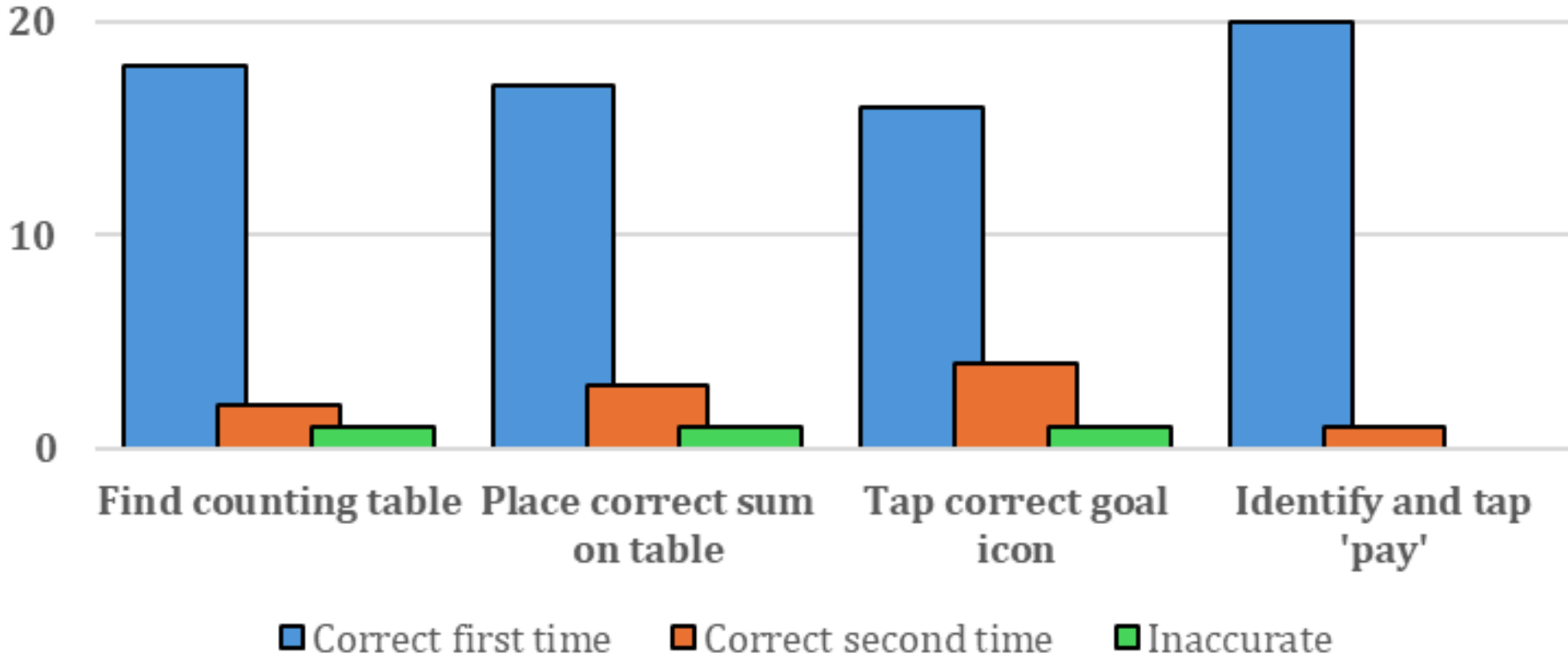
Testing, Steps 1-4 (Stage 2)

n=13



Testing Results (Steps 5-8)

n=21



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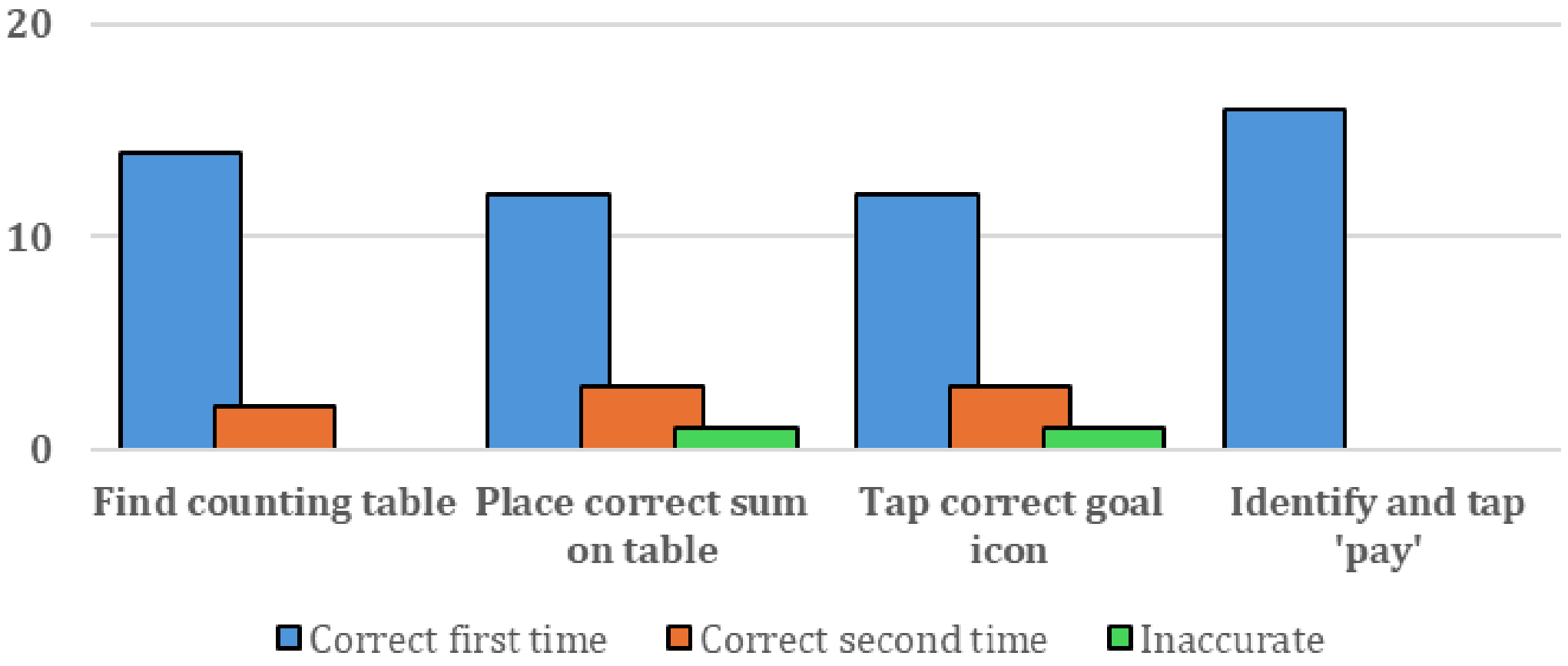
Testing, Steps 5-8 (Low Numeracy)

n=16



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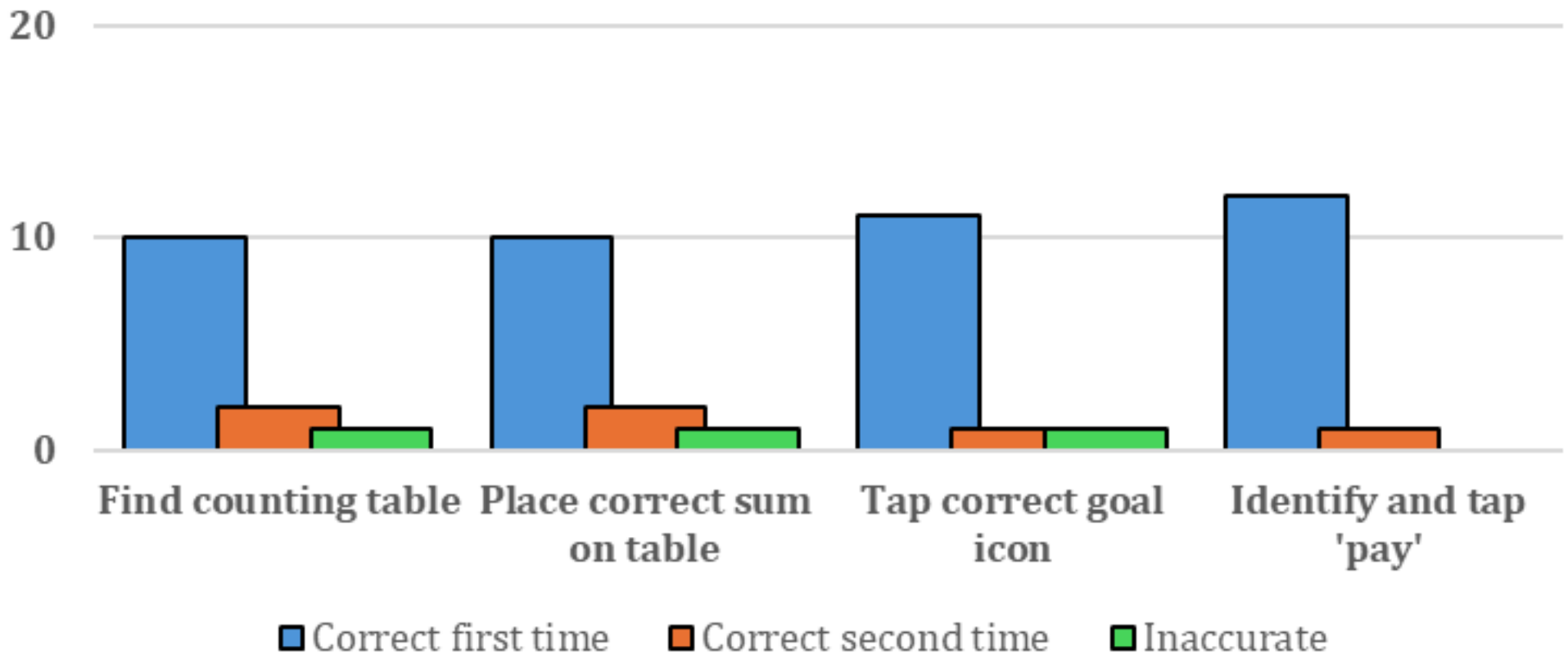
Testing, Steps 5-8 (Stage 2)

n=13



First Test, Technical Observations

The overall task flow was well understood and replicated the following day, with occasional errors. Biggest sources of user error:

- ✓Counting the sum displayed on the balance page,
- ✓Recognizing the aggregate currency units (50, 100 and 200 NLe),
- ✓Finding 'send money' path from balance to calculation page,
- ✓Placing the correct sum on the counting table,
- ✓Finding the 'goal' path of the calculation page, and
- ✓Tapping the correct 'payment purpose' icon.

Navigation was handled well, once users noted that the correct path to the next page was always to tap the icon in the upper right corner.

First Test: Qualitative Observations

Participants knew they were being tested. Most seemed relaxed.

- ✓ they had no trouble accessing the interface by tilting, and loved moving images of cash around to add and calculate;
- ✓ they had no trouble using the cash scrollbar, and easily learned that greyed out scrollbar items were not available;
- ✓ P7 misread the '100' as '20' and P5 misread the '20' as '2';
- ✓ trouble getting to next screen: often tapped cash images on balance page, or home box on upper left;
- ✓ 'send money' hand and coin misread as 'deposit' or 'low money';
- ✓ misread the 'goal' icon but discovered that tapping on the upper right hand corner always took them to the next screen;
- ✓ purpose icons: pharmacy/health and rent were easily understood,
  - ✓ school was understood a bit,
  - ✓ loan and grocery were harder to recognize; and
- ✓ blue 'send button' was grasped from its location, not its design.

Changes Between the Tests

Process tasks, interface structure and sequencing did not change. Changes included:

- ✓ The 'balance' amount was randomly varied between 100 and 199 NLe.
  - ✓ The 2-digit sum to be sent, and purpose of payment, was randomly varied.
- ✓ 'Send money' icon was removed from upper right on balance page
  - ✓ To test icon recognition, four task icons (send, withdraw, etc) were designed and displayed randomly under the balance
- ✓ Currency aggregates were substantially revised to improve recall
  - ✓ 50 and 200 were removed, a new '100 NLe' icon designed;
- ✓ Colourful local payment purpose icons were designed and randomly displayed to test icon recognition

Second Test, Technical Observations

The overall task flow was well understood the following day, again with occasional errors.

- ✓ The menu at the bottom of the balance page eliminated the 'send money' navigation confusion in the first test;
- ✓ Most participants recognized the new 100 NLe icon easily;

Biggest sources of user error:

- ✓Counting the sum displayed on the balance page,
- ✓Placing the correct sum on the counting table,
- ✓Finding the 'goal' path of the calculation page, and
- ✓Tapping the correct 'payment purpose' icon.

Navigation was handled well due to easier grasp of icons.

Second Test, Qualitative Observations

- ✓ everyone remembered how to take money off the table;
- ✓ most easily grasped meaning of new '100' icon; one mistook it for a 10;
- ✓ P14 was only person unable to count multiple notes;
- ✓ hard to navigate from balance to calculation screen
  - ✓ during both tests people tapped the cash on the table, trying to progress
  - ✓ P11 and P20 tapped 'deposit' before finding 'send money'
  - ✓ P9, P13 and P16 tap the upper left box before 'send money'
- ✓ some had trouble getting correct sum on table but mostly could self-correct;
- ✓ hard to navigate from calculation to goal screen
  - ✓ similar to the previous screen some people tapped upper left box, or cash on the table before finding the correct path

Participant Examples

P6

P6 is in her late 20s. Only able to read 5 of the 10 single-digit numbers (0, 1, 2, 3 and 5). After her parents divorced, she grew up with an aunt who couldn't afford schooling for her.

P6 made no errors in the usability test.

When asked if she would use the app, she replied 'of course!'

P1

P1 had some school experience, but didn't complete primary. Read numbers up to 100. Access to a smartphone through her husband. Uses 'over-the-counter' agent to send money.

P1 made one error: tapping the wrong 'payment purpose' icon.

"This app is much better than Afrimoney. Everyone would use it."

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Participant Examples

P15

P15 is in her early thirties and did not complete primary school. She has a mobile money account which uses for school fees, payments to family and market sales. She could read 5-digit ordinal numbers.

Confused the 100 with '1000' first time.

"It's simple, and you can correct your mistakes."

P21

P21 is in her late thirties. After her father left, she was raised by her grandmother, who couldn't afford her schooling. She resells retail products to a stay-at-home network, and has just secured her *keke* license. She read the 1-digit numbers, but couldn't go further.

P21 made no usability test errors.

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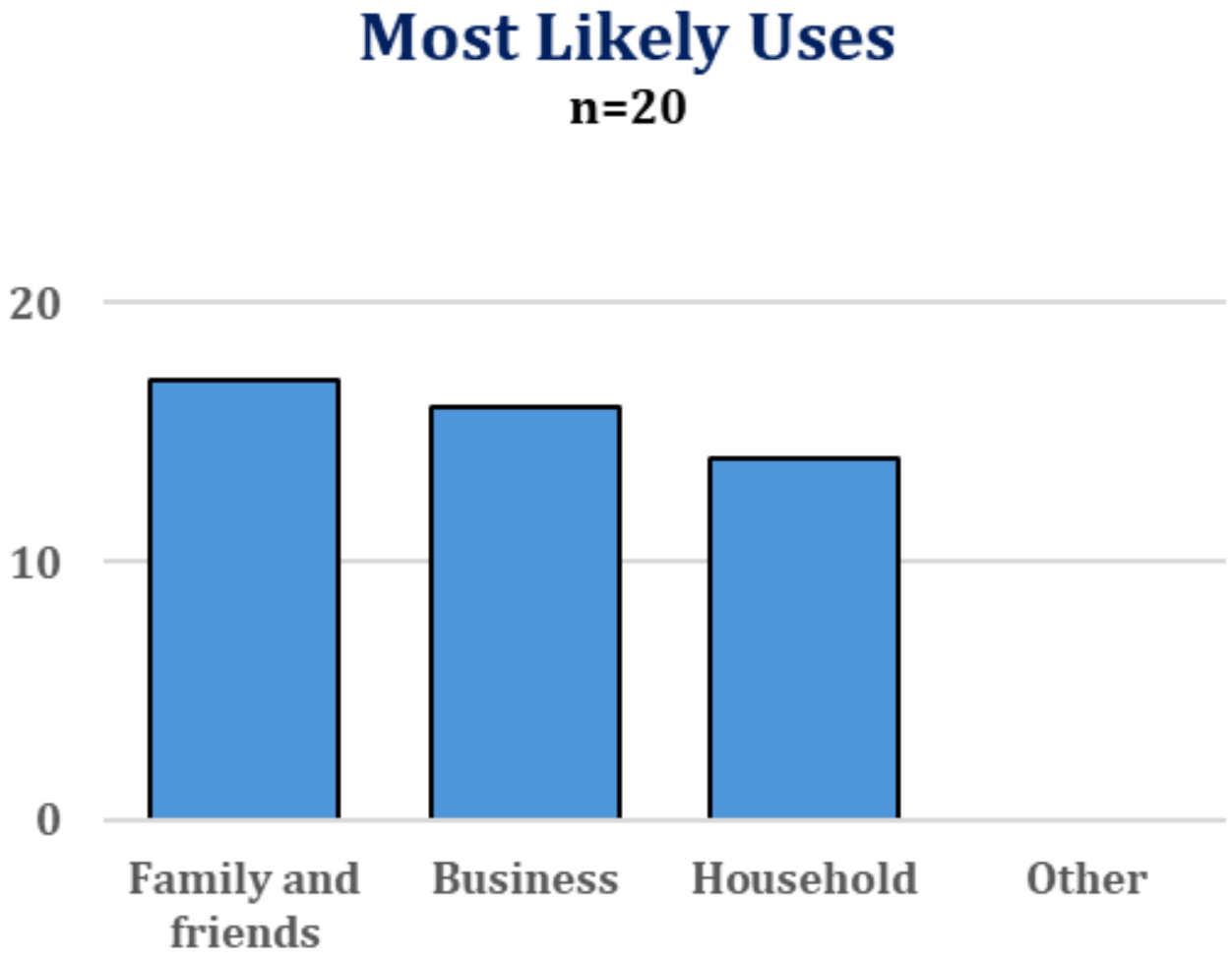
Would You Use OIM Taler?

After the test, participants were asked if they would use OIM Taler, if it were available in Sierra Leone? All stated that they

- ✓ would like to use it,
- ✓ prefer it to existing apps, and
- ✓ would share it with their friends and relations, especially those who had trouble with writing and numbers.

There was strong interest in all major categories of uses.



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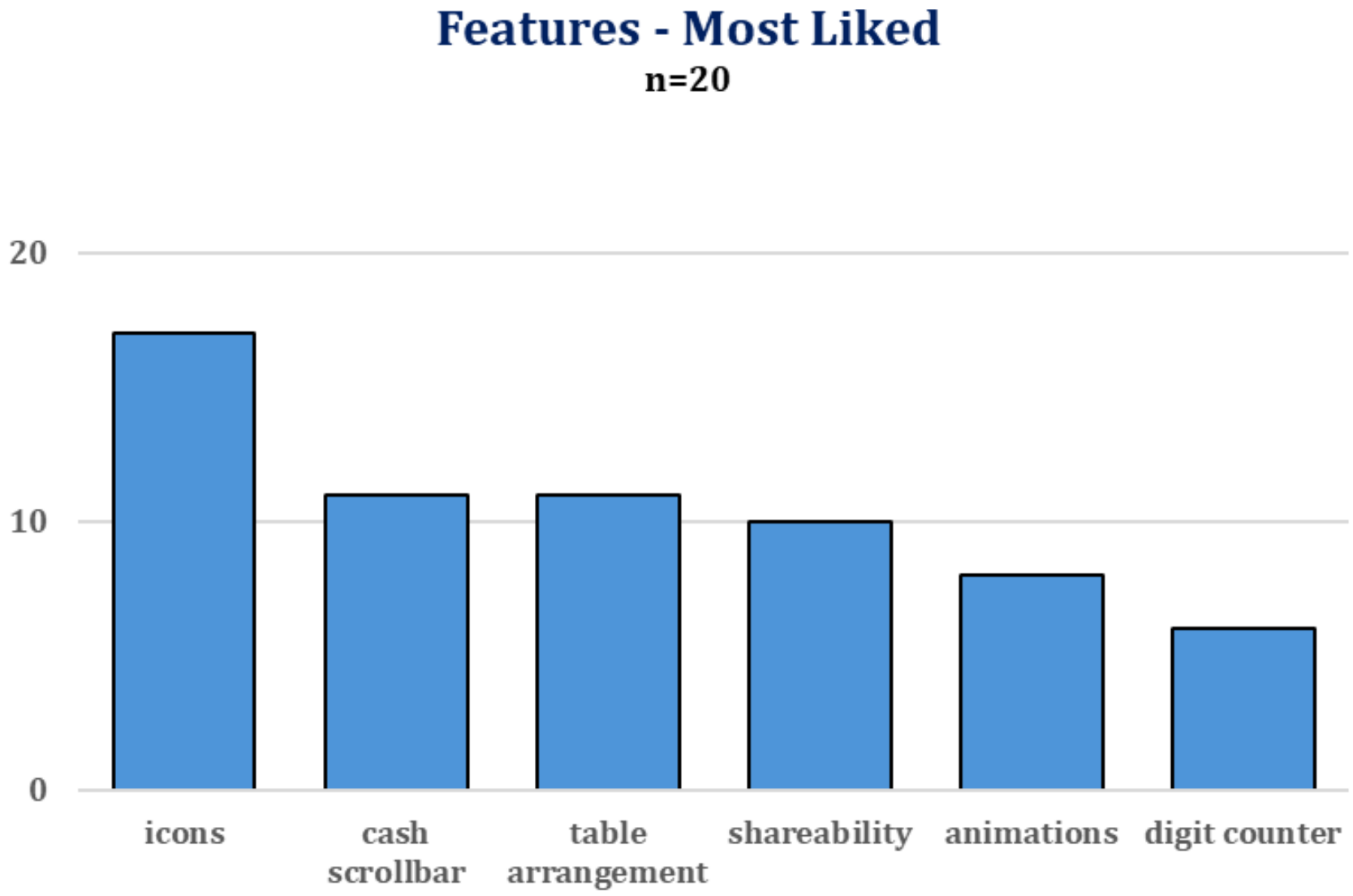
Participants most liked the icons. They liked the digit counter – the only conventional feature - least.

Appreciation of the digit counter might rise with repeated use. The design seems to be performing a 'bridging' function: supporting adaptation to conventional designs.



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Design

General Observations

The design logic utilizes items that are routinely used in oral cultures to count and calculate economic value, including

- a table on which to count money,
- the money itself, and
- mnemonic 'guessable' and 'memorable' icons to support navigation through tasks.

Images of money must be countable, with confidence, by unschooled adults. Counted sums must exactly match the Indo-Arabic counter in the upper-right, with no latitude for a different interpretation. Graphic counting provides a cross-check, analogous to writing both words and numbers on bank cheque. It is less subject to misinterpretation than voice.

Currency Representation

Adults with little schooling learn the relative value of different notes and coins by transacting in the markets. They rely on shape (including relative size), memorable or familiar images and colour for recognition. They pay less attention to the written numbers, unless they are trying to learn to read Indo-Arabic notation. The size of notes in Sierra Leone, like that in most nations, gradually increases with value, both in width and length.

- ✓ To conserve space and enhance the visibility of signature graphics, OIM zooms in on a fraction of each note, including the full width but only 50-60% of the length.
- ✓ As economic value increases, the width and length increase in relative size, parallel to the physical currency.

Auto-Aggregation

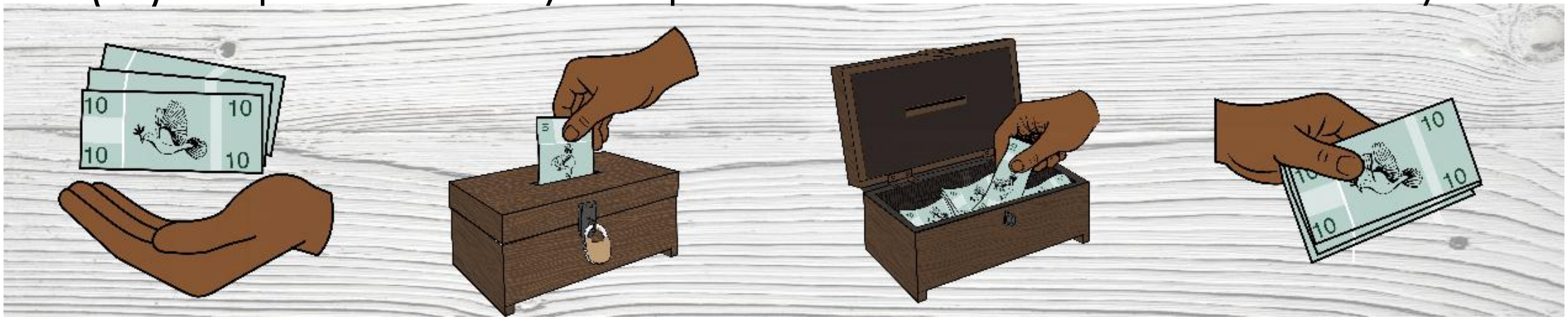
As users put more money on the table, some is aggregated to save screen space. Auto-aggregation principles depend on the relationship between screen proportions and ease of countability. They will remain somewhat unique to each currency until several currencies can be validated empirically. In the case of Sierra Leone the following worked:

- ✓ All items in any one column must be the same denomination.
- ✓ Denomination values rise from right to left (parallel to digits in Indo-Arabic place value notation).
- ✓ No more than four items in a vertical column.
- ✓ More than 4 of one denomination are automatically auto-aggregated to a higher-value currency icon.

Transaction Type

To address the navigation challenges uses were facing with the ‘send money’ icon, and create a more realistic digital context that confronts users with a menu of transactions, the team prepared icons for the four main transactions in OIM Taler, and in the second test presented this distributed randomly to test recognition. In this image they are

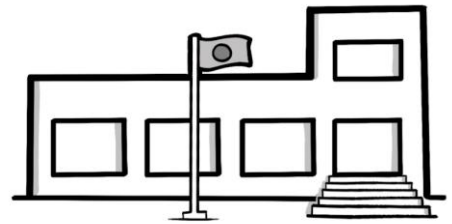
✓ (l-r) request money, deposit, withdrawal, send money



Payment Purpose

At Stage 1 the team consulted with NSWO on the five most common payment purposes for the context (food, housing, schooling, health and loan repayment). This test was used OIM images from Bangladesh.

- ✓ There was strong overlap, especially 'health' or 'emergency'.
- ✓ 'School' caused confusion, as schools in Sierra Leone do not fly flags. Loan repayment was not easily grasped.



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Payment Purpose (cont'd)

At Stage 2 the payment purpose icons were localized and coloured.

- ✓ Shop purchase, health/emergency, rent and school were easily recognized
- ✓ Loan repayment took longer and will need to be 'learned' before users become comfortable.

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Note Aggregates

In the first test the team used three aggregates:

- ✓ 50 = ten ‘5’ notes
- ✓ 100 = ten ’10’ notes
- ✓ 200 = ten ’20’ notes

These did not prove effective.

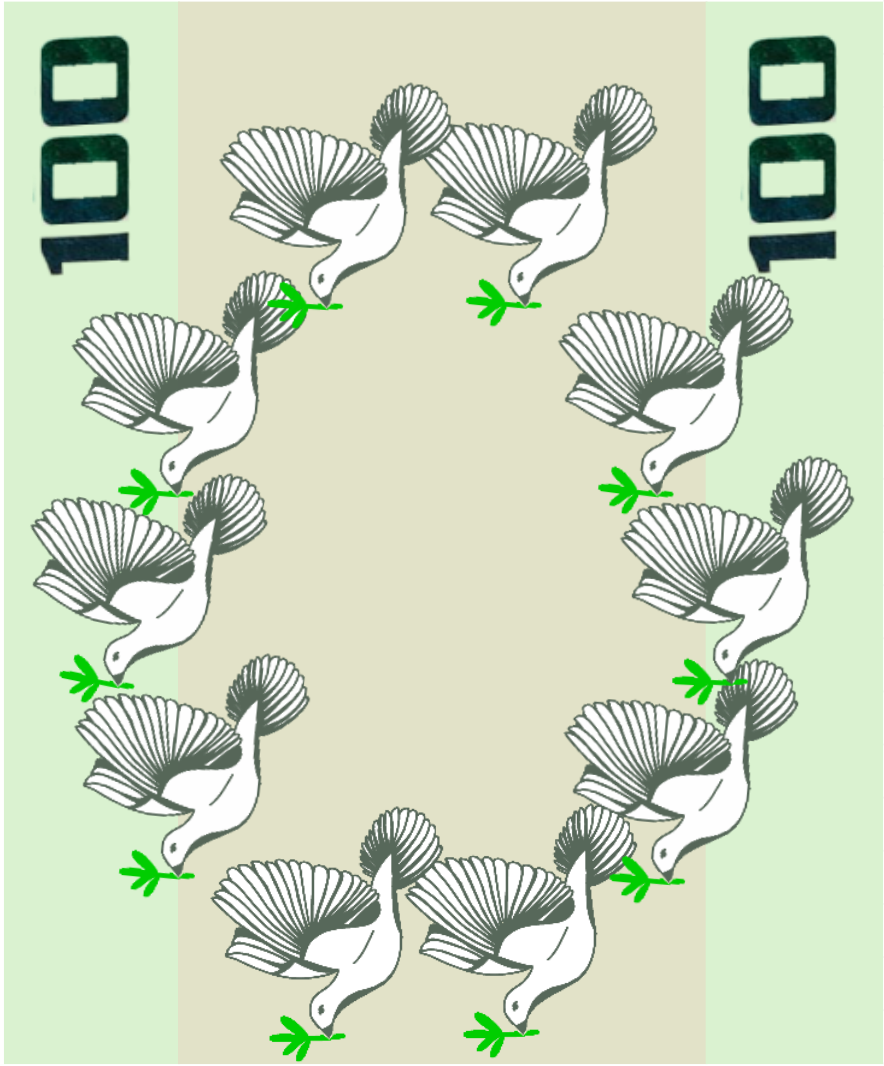
- ✓ users found the multiple bundles confusing; and
- ✓ they correctly counted only *two* notes in each bundle.

In Sierra Leone the ‘mama’ (20 note) is the largest. When people see bundles, they assume bundles of 20s. As a result, cueing ’10 * 10’ requires careful attention to context.

Note Aggregates (cont'd)

The highest-value unit of currency issued by the Bank of Sierra Leone is the 20 NLe note, worth about 1 Euro. Most stacks issued by banks and informal markets are composed of these, meaning that stacks of 10 NLe notes are not very familiar and risk confusion.

Based on the common reference to the 10 New Leone note as the 'bird' and a common belief that flocks of these birds fly in a circular formation, the 100 NLe icon depicts ten '10' birds on generic background, inscribed with a conventional-looking '100'.



Observations and Next Steps

Observations

Test participants were long out of school and knew they were being tested. Given this, their results were impressive.

- ✓ They seem to have been motivated both by the usability of the system, and their ability to learn financial numeracy skills like Indo-Arabic notation.
- ✓ Gaining familiarity with a payment app will take time and frequent use. It is not realistic to expect everything to become familiar immediately.

Brief exposure in a usability test will unavoidably leave users struggling with:

- ✓ certain navigation details, like keeping the phone tilted or finding the next screen; and
- ✓ unfamiliar note aggregates and unfamiliar icons.

However, when these are details that most participants can guess and remember quickly, they become learnable over a short interval. They should not present major barriers to adoption.

Observations (cont'd)

A more important barrier is fear of making an error when handling money.

- ✓ Part substantial fear: people in developing countries lose money in mobile apps frequently.
  - ✓ Making payments is stressful and can be interrupted by snapped connections, dead batteries, timing out or depleted funds.
- ✓ Part psychological fear: precisely because they are handling money, usually under time pressure, people are more nervous about making mistakes.

For this reason OIM Taler needs a very easy, intuitively obvious way to reverse course, check for errors, and assure the user that s/he is on the right track.

- ✓ A compellingly plausible resort is to physical navigation cues, specifically swiping backwards to reach previous screens, where worked can be checked and errors corrected.

Next Steps

- ✓ Complete the OIM Taler interface with the same team (Taler-NSWO/NSDC-MOVE) based on OIM principles
  - ✓ begin with usability, and
  - ✓ enticement of users to acquire basic financial numeracy skills.
- ✓ Use ‘tilt’ access system and animated auto-aggregation.
- ✓ Adapt the design for user safety: so that users can scroll backwards to previous pages/steps in any process (send, receive, withdraw, history etc) and can correct or return to their current work.
- ✓ Add ‘micro-animation’ (< 1s) to the suite of design tools to enhance guessability, learnability and usability of icons.
- ✓ Graphically differentiate the scrollbar from the counting table.
- ✓ Reinsert the red shadow around the final ‘send money’ icon.
- ✓ Replace the ‘goal post’ (payment purpose) icon simply with the ‘send money’ icon for integration.

Next Steps (cont'd)

- ✓ Establish auto-aggregation principles based on at least 3-5 distinctive use cases, including Euro and New Leone. Other key variations in arrangement of cash on counting tables that need clarity include:
  - ✓ optimisation of note shape,
  - ✓ selection of denominations (not 100% in all cases), and
  - ✓ physical representation of decimals
- ✓ Draft all core components of the OIM Taler interface design for usability testing during a second round in Freetown in the second half of August.
  - ✓ Identify target concepts in remaining interface components that may require field testing.
  - ✓ Complete field testing for icon development through NSWO before the second round of testing starts.
  - ✓ If feasible include a European nation, such as Greece, in usability testing.