Design Considerations for a Financial Management System for Rural, Semi-literate Users

Kaushik Ghosh, Tapan S. Parikh[1]
Media Lab Asia
MIDC Road
Andheri East, Mumbai, India
+91 (22) 2831-2930
{kaushik, tapan}@media.mit.edu

Apala Lahiri Chavan
Human Factors International
Saki Vihar Road
Andheri East, Mumbai, India
+91 (22) 2857-2062
apala@humanfactors.com

KEYWORDS

In this paper, we describe the design process, results, and general observations obtained in designing a user interface for managing community-based micro-finance institutions in rural India. The primary users studied were semi-literate village women. We discuss our contextual study observations and conclude by presenting a grounded design approach that best leverages the existing learning patterns of the users.

KEYWORDS

Literacy, User-centered Design, Contextual Design, Rural Development, India, Micro-finance, Interface for illiterate

INTRODUCTION

Since the emergence of the Grameen Bank in the late 1970s, *Micro-finance* - defined as the provision of financial-services to poor, disadvantaged and otherwise under-served communities - has arisen as an effective tool for local economic development. In India micro-finance activities are commonly organized through local community-based savings and lending groups called Self-Help Groups (SHGs). SHGs typically number between 15 to 30 members who communally save money in a common pool, which is then on lent (with interest) to other group members for consumption, business development, education, health care or other needs. SHGs also serve as financial proxies within the larger economic system - several well-known banks in India have started programs of rural lending through SHGs [1].

THE WORK MODEL

The community activities for the financial transactions are organized in the form of weekly village meetings involving all SHG members, the group head and the community

accountant. During these meetings monthly subscription amounts are collected from members, followed by outstanding payment collections for previous loans, default penalties and maintenance fees. Transaction details of the meeting are recorded into a basic data entry sheet and later transferred into standard ledgers and notebooks. The current manual information management and accounting systems, which are based on notebooks and ledgers, present significant information management bottlenecks due to problems such as inefficient data reporting, inaccurate interest calculation and slow data propagation. The digital documentation of group transactions, which typically occur in small and remote villages, is difficult due to inconsistent power, lack of connectivity and unaffordable computing devices. Efforts are currently underway to overcome some of these obstacles [2].

Another problem is the lack of literacy skills among group members. Interestingly, the results of basic literacy tests reveal that group members can remember, manipulate and enter numbers, even if they are lacking formal numeric literacy. This is likely due to exposure to number-based data formats and tools such as calendars, bus timetables, telephones and calculators, as well as the experience with calculations in group ledgers and data entry sheets. Thus the design of an accessible user interface for such users based on an intuitive 'numerical sense' presents an interesting and important research problem.
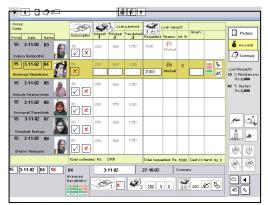
THE DESIGN PROCESS

During the data gathering phase we attempted to study the existing work practices of the SHG group members with a focus on the intuitive learning patterns of semi-literate users to overcome the literacy barrier.

Having observed the user's ability to associate specific types of information with tangible or abstract identifiers in order to memorize, comprehend and learn, we devised a set of cognitive tests using a series of abstract symbols and numeric entities each designated with a semantic legend of contextually relevant information.

The test subjects were given questions to solve with the previously learned knowledge of legends. A typical question: A recorded declaration was read out from the loan ledger-"Malini from Manakulam village was given a

loan of Rs. 4100 for buying cattle on 12/10/02 at 18% annual interest." Then they were presented audio enabled legends for 'date', 'loan amount' and 'interest percent' and asked to record the corresponding relevant data from the specified declaration. Only 32% subjects were able to complete the task correctly. Average time taken for the task was 7.6 min.

The initial interface concept was based on representing navigation paths as numbers. This path could be accessed simply by memorizing the required numeric path. This was tested with the users. 68% of the subjects misinterpreted the numeric hierarchy (the navigation path) as actual data (the value of the number). Photographs of the users provided a very significant cue in terms of screen landmarks. Most tasks were best represented through the judicious use of icons.

The second iteration of the prototype was based around their own model of tabular data organization and a metaphor of modality between various types of transactions, following closely the organization and structure of a typical group meeting. The results of the second test revealed significantly better acceptance and improved recognition.

DESIGN INSIGHTS

Tabular Data Organization

Users have a very practiced knowledge of the tabular organization of the data used in the group accounting ledgers. Learning for these users was often found to be based on repetition and memorization of regularly followed practices. Thus repeated data entry into the tabular ledger formats has led to an advanced understanding of their organization and significance.

Numeric Data Formats

While numeric data values were well-comprehended, numeric representations of actions and interface navigation did not work nearly as well. The numeric data formats (dates, interest percents, sums, etc.) provided significant cues for overall comprehension of information. This was augmented by the already existing conceptual framework of the layout and relative positioning of numeric data

values in tables. The results of the cognitive tests suggested that numeric data becomes difficult to interpret when deconstructed and presented as a set of identifiers.

Importance of Physical Model

When the conceptual prototypes were tested, a significant portion of users showed the empty data fields in the table when asked where they would enter data. Again, when the empty fields were populated by a default '0', the users almost always comprehended it as non-payment. This indicates close mapping of the user's mental model with the physical reality of paper-based documentation.

CONCLUSION

During the design process we observed a learning pattern among these rural semi-literate users where numbers are comprehended and memorized through correspondence with existing tabular data formats. We found that numerical operands are recognized only when they are found in their contextual location and interface prototypes were most easily understood when they corresponded to existing physical formats. These observations lead us to look at a new form of information system where a physical paper-based data format complements the digital system. This will also allow for a lower-cost locally sustainable solution.

FUTURE WORK

A low-cost hybrid computing paradigm is currently being investigated where physical representations are part of the information system. For example, through the combination of an annotated paper mat with embedded bar codes and a simple hand-held scanner, a cheap and effective data navigation and entry system could be devised.

ACKNOWLEDGMENTS

REFERENCES

1. Seibel, Hans D. SHG Banking: A Financial Technology for Reaching Marginal Areas and the Very Poor: NABARDS's program of promoting local financial intermediaries owned and managed by the rural poor in India. IFAD Rural Finance Working Paper No. 167910, March 2001.

2. Simputer Home Page http://www.simputer.org. Visited Nov. 15th, 2002.

3. Huenerfauth, M. Developing Design Recommendations for Computer Interfaces Accessible to Illiterate Users. Masters Thesis, University College Dublin, August 2002.