

A Case Study on the Use of IVR Systems by Visually Impaired People

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1. INTRODUCTION & MOTIVATION

Interactive Voice Response Systems (IVRS) have been used extensively to engage with poorly literate populations in the context of public health, farming, community radio, citizen journalism, and other sectors [2-7]. The voice based medium on IVRS, and the easy to use phone interface, seem to have been useful to help poorly literate and non-IT savvy populations to interact with automated computerized systems. In this study, we explore the use of IVRS for visually impaired people. To the best of our knowledge, we have not come across the use of IVR systems as an assistive technology to engage with this segment, and we describe an initial experiment we did in India. Based on our results, we feel much potential lies in researching this further because equivalent systems such as SMS and the use of screen-reading software on phones [1] are available to only trained or educated or higher income users from among visually impaired people.

We did this study as part of a weekly national radio show in India 'Eyeway – Yeh Hai Roshni Ka Karawan' broadcast on All India Radio, run by a NGO called Score Foundation that works with visually impaired people. The radio program is in Hindi and is targeted towards visually impaired people living in semi-urban and rural areas. To create a back-and-forth engagement with the audience, we designed an IVR system that was publicized as part of the radio show. In this abstract, we describe our experience and put forth ideas for further research.

2. DESIGN of IVRS

Figure 1 describes the IVR workflow we developed to study several interesting questions. The callers, assumed to be primarily visually impaired people, were first asked whether they want to give any feedback on the radio program, or clarify any queries with the Score Foundation, or participate in a quiz that had been announced that week on the radio show. Our intention here was to understand why people call into the IVR – is it to participate in the quiz or to engage with the NGO – which would help indicate ways in which the NGO can remain engaged with its beneficiary community. After the callers had chosen whether they want to give feedback or answer the quiz, they were first asked to provide their personal details including their name, profession, location, and whether or not they were visually impaired, to get an understanding of the background of the callers. Since several pieces of information were needed, we wanted to study the completeness of information provided if all the information was asked in a single prompt, or over two prompts, or over four

prompts with one prompt for every individual piece of information required.

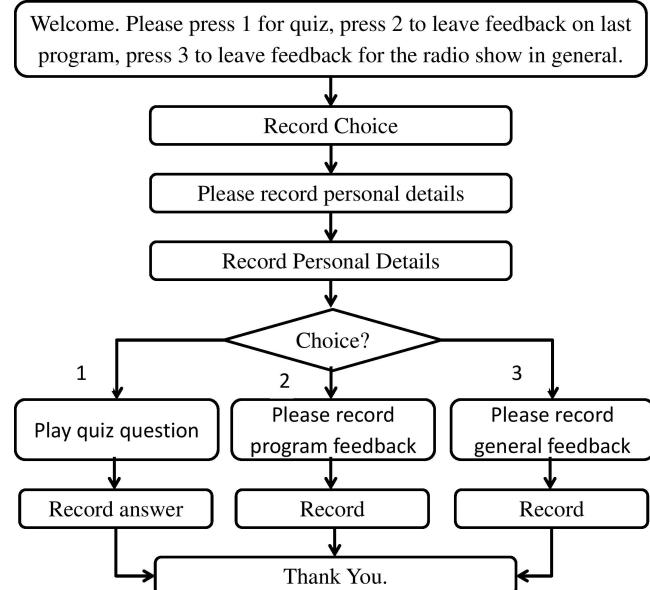


Figure 1. Design of IVRS

3. RESULTS & DISCUSSION

Impact of the IVRS on participation: The radio show spanned 10 episodes and the IVR system was introduced in Episode 7. Figure 2 below shows the volume of communication tracked by the NGO on SMS/Email throughout the radio show, and the number of IVR calls received from Episode 7 onwards.

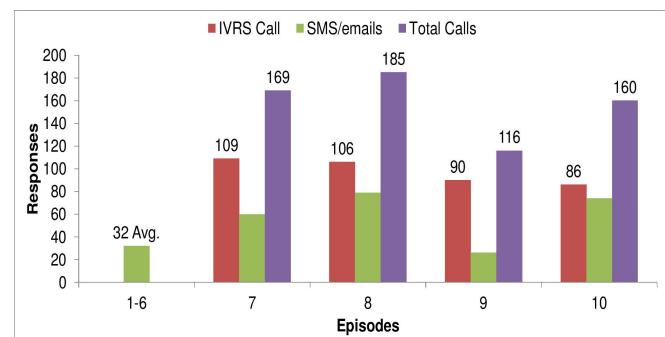


Figure 2. Response across Various Channels

It is clearly evident from the figure that post the introduction of IVR, the participation of listeners/callers increased tremendously and IVR was the dominant form of communication that the

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DEV '13, January 11-12, 2013 Bangalore India
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audience chose. 391 calls were received on the IVR system in four weeks from 205 unique callers (grouped by caller-id). Out of these 205 callers, 94 provided information of their visual impairment with 76 being visually disabled. We therefore infer that the majority of IVR callers were visually impaired. Further, only 11 caller-ids were common between IVR and SMS, indicating that most people chose either IVR or SMS to engage, and the IVR medium brought participation from new callers to the platform. Thus, not only did IVR increase the overall participation, it also brought in participation from those visually impaired people who had until now not engaged with the NGO on other fronts. Given that no training was given to any of the callers on IVR usage, our results are encouraging that IVR systems may be a viable medium to engage with visually impaired people.

Usability of IVR systems: Out of the 391 calls, we found that no option (quiz/feedback on program/feedback for NGO) had been selected in 182 calls (approximately 46%), and the subsequent audio recordings were also blank or “hello... hello...” recordings. This percentage of usability failure is in fact similar to that noticed in previous work with poorly literate urban migrant workers in India [2], and indicates that specific training or tutorials on the radio program may be required to improve IVR usability. However, with greater than 50% success rate, IVR still holds significant potential to act as a communication medium even for visually impaired people.

Soliciting information on IVR systems: We also experimented with different ways to collect personal information from the callers (name, place, profession, and visual impairment), by presenting at random to different users:

- Four different prompts, one for each piece of info
- Two different prompts
- One single prompt

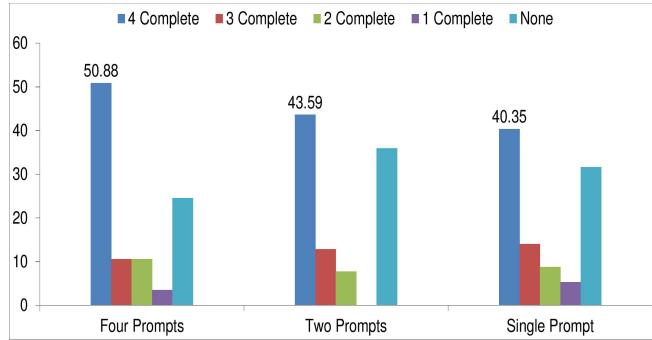


Figure 3. Task Completion on Different Prompts

Figure 3 shows the percentage of task completion for the different types of prompts. It is clear from the figure that four separate prompts were the best way to ask for four pieces of information i.e. more people were able to provide complete information if all the questions were asked separately. This information can be used to structure IVR surveys in the future.

Reason of Calling: Figure 4 shows a breakdown of the options selected in the calls, from among the $(391 - 182 = 209)$ calls in which an option was selected. It is interesting that 77% choices were to participate in the quiz. This is a useful insight that can be used to attract people to engage with the NGO and get interested in its community.

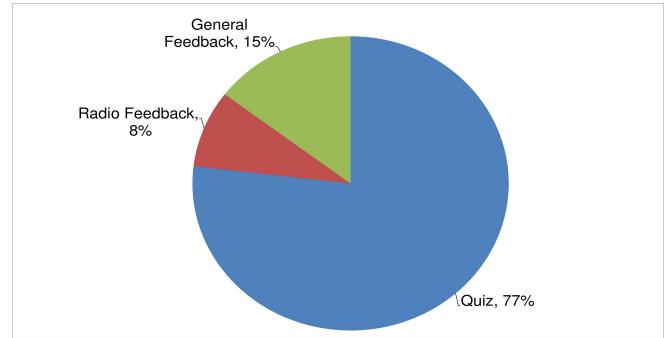


Figure 4. Options selected by Callers

We also studied the weekly call pattern after an episode was broadcast on radio every Wednesday at 9:00 pm. Figure 5 shows the average and standard deviation of the number of calls received each day. It is clear that most calls are received on the same day or the following day of the broadcast.

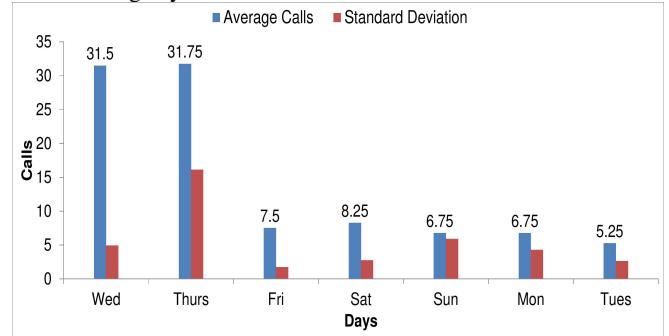


Figure 5. Received Calls over Week

4. CONCLUSION & FUTURE WORK

In this study we found a positive response to the use of IVR systems for visually impaired people. We feel this warrants more research on specific aspects such as the ease of key-presses Vs automatic speech recognition, mobile usage practices by visually impaired people, and comparison with other means such as SMS and Email.

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