

# **Usability and Digital Divide: A Study on Usability Issues for Off-Farm Workers in China**

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Digital divide is one of the great challenges the human society faces, along with the world's informationization process. Although the socio-economic factors are the main reasons for the digital divide as most people understand, we believe that digital products' usability is another important factor that exacerbates this problem. The role of usability affects the digital divide from two aspects. Firstly, it is the neglect of the needs of vulnerable groups when digital products are developed. Secondly, it is the less consideration of ease of use concerns specific for this group. The usability improvement for digital products to these groups will help in the endeavor to eliminate the digital divide. So, it makes sense to undertake research on this topic aiming at having better knowledge on the issue and seeking for potential solutions.

We conducted a study on usability of digital products for off-farm workers in China. We choose this group as our target for two reasons: Firstly, off-farm worker group is a special social group that has emerged in the urbanization process in China. It is a vulnerable group not only in digital divide between the urban and rural but also between different groups in the cities. Secondly it is a very large social group amounted more than 120 million, nearly 10% of China's total population []. The study was conducted in 2006 in Dalian, China which is an economic center and a coastal open city in northeastern China, where a large number of off-farm workers from all around China live and work. It is more than half a million, accounting for 10% of the population in this city. Therefore, from the study we could expect to some extent to draw some conclusions applicable to the situations nation-wide.

Our research is divided into four stages. The first stage is to grasp and understand the ethnographic characters of off-farm workers through literature review; The second is to understand the specific requirements of off-farm workers and how they acknowledge and use digital products by field observations and interviews; Then through usability testing of a popular mobile phone we attempt to understand the special usability issues that affect their using digital products. And finally we adopt a cooperative design method together with the off-farm workers to design a prototype that is usable to them exploring effective approaches for designing for this group.

In the field studies and interviews, we find that off-farming workers are eager to get information about job opportunity and living. However the current information products and services are unable to meet their special requirements. They also need to upgrade their working skills to meet the ever increasing demand on skill level. Actually there is a lot of relevant information available on the web. However, very few off-farm workers use the Internet. Only three out of fourteen interviewees we interviewed once used the web (two of the three are no longer online). Their online activities are limited to chat and games. They mentioned two reasons why not using the web. One is that they do not think the web has the information they needed. The other is that they think the web is designed for the people with higher education and not for them to use with ease. So it seems clear the usability problems prevented off-farm workers from benefiting from the web. Mobile phone is the most popular digital product in China. Most of off-farm workers possess and use it. 13 out of 14 persons have their own mobile phones. Lack of fixed residence is a major characteristic for off-farm workers. The mobile phone has become the main way for them to be

contacted by their current and potential employers and for them to get in touch with their families. But we found that the major function they use is just making calls and responding calls. They rarely send text messages, not mentioning any other advanced functions. Some of the interviewees do not even use the phone book function. So the mobile phone functions are far from being fully used by the off-farm workers. Their explanations are that the functions are useless, or not aware of their existence, or do not know how to use them. According to our observation, some mobile phone functions they never used are actually useful and helpful for them. For example, we observed they often need to note down on a piece of paper employers' contact or certain information about forthcoming job opportunities. These kinds of thing actually can be done readily by notebook or SMS function of the mobile phone. But the usability obstacles hindered them to use the functions. So from the above, we could see that usability problem of digital products and services is an important factor that exacerbates the digital divide for off-farm workers.

At the process of the usability testing, we chose the mobile phone as test product which is evaluated as ease of use phone by the people on the online mobile phone forums, 16 off-farm workers were recruited as test users. We took age, gender, geographic and other factors, into account in the recruitment. We designed five scenarios to let users use mobile phones to complete. The main tasks of five scenarios included calling, sending message, setting memorandum, changing ringing, and accessing phone numbers. As the test data information showed, many users were unable to complete their tasks by themselves. They needed to get the help from the experimenter. When they did some tasks, they made too much mistakes and needed too long time. For instance, some users actually spent more than 19 minutes to set a memorandum. Some users made 23 errors in the process of changing phone ringing. The error occurred in the process of using mobile phone were divided into two categories: the first is that the test user can not judge the functional option correctly to complete tasks; The second is that the test users didn't use the functional option which were set to enhance the efficiency of completing the task. So it is clear that the names of the functional options are not true of the language of off-farm workers. The work flow of the function is not consistent with the cognitive habits of off-farm workers. These substantiate the requirements and cognitive abilities of off-farm workers are not taken into account when designing and producing mobile phones. These cause serious usability problems when off-farm workers use the mobile phones. The usability issues exacerbate the gap of using digital products, between off-farm workers and mainstream groups. In other words, the usability issues aggravate the digital divide.

Finally, we used the method of user participation in design to design the mobile phone paper prototype that is consistent with the cognitive abilities of off-farm workers. First of all, we set up a team including 4 usability experts. Then we recruited 8 representative off-farm workers. Each one of the users is asked to talk about how to use a mobile phone to complete the five scenario tasks with the team. At the same time, the user painted the UI flow of the task on the whiteboard assistant by one expert. Other experts understood the user's words and recorded the data information about finishing the task. After this phase, we started to design and produce the paper prototype of mobile phone in the view of off-farm workers. At last, we recruited eight off-farm workers to evaluate the paper prototype and improve it. As the final results showed, through the first 3 users' evaluating the paper prototype and improvement, the last 5 users could succeed in finishing five scenes task without confusion by the prototype. It is a good proof that using the user-centered design in the process of designing digital products could eliminate the usability issues which off-farm workers suffer. Further the user-centered design can help bridging the digital divide.

In the conclusion, it is undoubted that the usability of using digital products for vulnerable groups is one of factors that exacerbate the digital divide. User-centered design is a good method to eliminate the usability factors of the digital divide and help bridging the digital divide. In the future, we will further promote the study of more vulnerable groups, such as farmers. Meanwhile, we will also promote the study of network products, digital home appliances, and other products.