Women, Gender Equality, and Digital Technology

Rojin Vishkaie[(✉)]

Ball State University, Muncie, IN 47306, USA
vishkaie@bsu.edu

Abstract. This exploratory study investigates the subject of the gender equality and women's empowerment and their engagement in smart development, with a primary focus on ICT and wearable technologies, such as small-scale intelligent devices and interactive sensor elements. Although a growing body of academic research on the topic is increasing, there is a gap in envisioning how aspects of the wearable technologies can optimally engage with the context of the development field and women's empowerment in developing countries. The main contributions of this study combine both empirical and conceptual design components to support the design and evaluation of a smart development that enhances gender equality and women's empowerment in developing countries. The first step towards this study was to con-duct a pilot study that involved five newly arrived African women in the USA. Participants were asked to discuss their experience with the role that current digital technology plays in women's empowerment and gender equality.

Keywords: Women's empowerment · Digital technology
Empirical and conceptual design studies · Human-computer interaction
Interaction design

1 Introduction

In the field of development, gender equality and women's empowerment are still key challenges to overcome in many developing countries with complex social and cultural factors. In this context, development interventions can be made more effective when factors such as gender inequality and the marginalization of the needs and roles of women, are reduced. Employing Information Communication Technology (ICT) as a means to increase gender equality and empowerment of women, can potentially contribute to greater health, development, and economic outcomes in developing countries. In many developed countries, small scale, intelligent devices and interactive sensor elements are being incorporated into clothing, fashion, and other types of wearables, significantly impacting the modern lifestyle. More recently, there has been a rapid growth in both interest and use of these technologies that are quickly becoming mainstream. However, despite this rapid growth, there is limited exploration into the influence of these technologies, particularly in the context of the development field and women's empowerment in developing countries [1–10].

Building upon existing academic research, as well as an initial exploration into enhancing women's empowerment using digital tools, the results aim to better inform the explorations into gender equality and women's empowerment. This study presents a step towards integrating the use of digital tools and enhancing women's empowerment. A preliminary pilot study in a focus group format was conducted. The overall results of the discussion with women showed that they believe current digital tools and wearable and sensor technologies maybe inadequate to educate facilitate behavior change among women in developing countries. The following sections expand on the scope of the study and the preliminary study conducted.

2   Study Scope

This study proposes to explore the role of ICT in creating a smart development to enhance gender equality and women's empowerment in developing countries. Specifically, this study explores the role of current digital technologies and the untapped potential for wearable technologies, to enable and empower women in developing countries. This empowerment can have a positive effect on confidence and decision-making in households and society, as well as a sense of increased safety from violence, which are all issues that must be addressed to enhance gender equality. This study is multidisciplinary, focusing on social science, design, technology, and human-computer interaction Human Computer Interaction (HCI) aspects of gender equality and women's empowerment in developing countries. In this study, empirical and design research study will be employed to investigate the current use of wearable technologies to determine their impact for educating and empowering women via health, nutrition, family planning, and economic information. Ultimately, this study introduces an unconventional attempt to create low-cost interactive tools using wearable technologies to examine the influence of smart development and measure the impact of different aspects of smart development, such as health and development programs (e.g., contraceptive prevalence rate), access to digital financial services, equitable decision-making power, and shared control over assets and income. As a result, this study would allow for monitoring and real-time feedback of gender equality and women's empowerment in developing countries [1–10]. For example, the low-cost interactive tools will be used as a bracelet, necklace, or button to measure women's body temperature, heart rate, or perspiration activity. This data will be collected and fed back to medical professionals for monitoring and improving women's health. Button cells will be used to power the low-cost interactive tools.

2.1   Objectives

This study will have the following objectives:

- To investigate the role that current digital technologies play in enhancing gender equality and women's empowerment. This objective aims to explore the way mobile phones are used to educate women via providing information.

- To examine the role that available digital technologies play in communicating the health, development, and economic information to enhance education of women in the developing countries. This objective aims to investigate the way mobile phones are used in developing countries to educate women via providing health, nutrition, family planning, and economic information.
- To understand the influence of wearable technologies in educating women in developing countries. This objective aims to explore strengths and weaknesses that wearable and current digital technologies have, thus defining a user centered design process for the creation of low-cost interactive tools which can help enhance gender equality and women's empowerment in developing countries.
- To design and evaluate low-cost interactive tools to enhance gender equality and women's empowerment in developing countries. This objective attempts to determine the effectiveness of health, nutrition, family planning, and economic information in gender equality, women's empowerment, as well as educating women in developing countries.

2.2   Method and Study Design

This study will employ the qualitative methodology of ethnography and contextual design, as well as semi-structured interviews, participant and non-participant observations, structured survey-based methods, as well as walkthroughs of experimental prototypes. Focus groups and think-aloud methods will also be used in this study. In this study, a generalizable experience sampling system will be developed via a wearable technology platform for the real-time collection and delivery of information on health, nutrition, family planning, and economic aspects of development while influencing gender equality and women's empowerment. In a series of small trials, information will be fed back to women about their experience in a number of innovative ways. These experiences will then be examined to determine whether and how the information influences women's interactions and behavior. These user-informed experiences can encourage empowerment and equality influences, thus potentially providing positive evidence to be drawn from the experience of women within smart development. This study aims to encourage women to reflect on how they feel and where and when they have positive experiences towards empowerment and equality, while using digital wearable technologies [11–15]. Moreover, the low-cost interactive tools will be evaluated by USA-based, female participants for usability and acceptability. While USA-based, female participants may have different needs and demands to those in developing countries, testing in the USA will be cheaper than testing overseas, which would take place in Phase II if the study outcome was successful.

3   Study To-Date

3.1   Pilot Study

Initially, a pilot study was conducted as a small-scale, focus group exploration designed to gather information prior to a larger study. The results of the pilot study will be used

to improve the quality of efficiency of a further, larger study. Furthermore, in the pilot study, a total of five participants including African women - two Liberians, two Madagascans, and one Guinean - who recently arrived in the USA were recruited by using a purposeful sampling technique, and via an email distribution list sent to African community association in the USA. Participants had the freedom to explain their background, existing knowledge, and prior experience. The discussion in the focus group was led by the researcher. The focus group was held to identify potential conflicts in terminology arising out of the influence of digital technologies to enhance education of women in the developing countries or expectations from different individuals participating in the discussion. To enable participants to put forward their own opinions in a supportive environment, they were allowed to give their opinions and discuss their ideas about the role of digital technology in women's empowerment and gender equality with the other participants in the focus group.

3.2   Procedure

In the pilot study, extensive, manual note taking and audio recording were used to document the discussion. The discussion notes and audio recordings were written up and transcribed verbatim. The discussion within the focus group lasted approximately for two hours. Moreover, affinity-diagramming technique was then used to analyze the data.

3.3   Findings

Though time was limited during the preliminary pilot study, the focus group discussion informed a better understanding of role that current digital technologies including wearables that play in educating women in developing countries.

   All Participants noted that current digital and wearable technologies do not facilitate women's empowerment and gender equality. All participants mentioned that new wearable and sensor technologies should be incorporated into the social and economic norms of target communities within the low-income settings of developing countries. As one participant noted, (P3): "Women in low-income countries have limited knowledge of the benefits of digital [and wearable] technologies. And, there is a lack of social support, often women who don't reach these facilities are left out."

   Participants also believed that the barriers for women's behavior change are numerous and span motivation, ability, skills, knowledge, and environment. Participants were particularly interested in obtaining health-related information which could potentially improve maternal, newborn, and child health. Furthermore, some of the participants' suggestions involve the following: sensors for an expectant mother and newborn that measure blood pressure, heart rate, respiratory rate, temperature, sleep state, and activity; sensors to facilitate hand washing or other infection prevention measures; wearables that reinforce positive behavior in the mother in language interaction. As one participant said, (P5): "It would be very helpful to be alerted when the baby sleeps and wakes up, also to have patches that measures the baby's metabolites such as glucose."

4   Future Work

If the study in Phase I demonstrates promising results, hence a study Phase II will be conducted in developing countries (e.g., an African country). Study Phase II will be focusing on the planning of a business model for the manufacture, distribution, marketing, and retailing of the low-cost interactive tools which could potentially enhance gender equality and women's empowerment.

5   Conclusion

This study attempts to contribute to a deeper understanding of the role that current digital technologies play in improving gender equality and women's empowerment in developing countries. This study will succeed in further contributing to exploring the role that wearable technologies could potentially play in investigating the influence of smart development as well as gender equality and empowerment of women. On the design and empirical level, this study will contribute to the creation and evaluation of future, low-cost interactive tools that help create enabling environments and educate women via accessible health, development, and economic information.

References

1. Gates, M.: Putting women and girls at the center of development. Science **345**(6202), 1273–1275 (2014)
2. World Bank: World Development Report 2012: Gender Equality and Development. World Bank, Washington, DC, USA (2011)
3. Grameen Foundation: Women, Mobile Phones, and Savings: A Grameen Foundation Case Study. Grameen Foundation, Washington, DC, USA (2012)
4. World Bank: Voice and Agency: Empowering Women and Girls for Shares Prosperity. World Bank, Washington, DC, USA (2014)
5. Haddad, L., Hoddinott, J., Alderman, H.: Intrahousehold Resource Allocation in Developing Countries - Model, Methods, and Policy. The John Hopkins University Press, Baltimore (1997)
6. Miner, C., Chen, D., Campbell, C.: Digital jewelry: wearable technology for everyday life. In: CHI 2001 Extended Abstracts on Human Factors in Computing Systems (CHI EA 2001), pp. 45–46. ACM, USA (2011)
7. Cherie Blair Foundation for Women: Women and Mobile: A Global Opportunity. GSMA Association and Cherie Blair Foundation, London, UK (2010)
8. Everts, S.: Gender and Technology: Empowering Women, Engendering Development. Zed Books, London (1998)
9. Leonardo, M.: Gender at the Crossroads of Knowledge: Feminist Anthropology in the Postmodern Era. University of California Press, Berkeley (1991)
10. Cohoon, J., Aspray, W.: Women and Information Technology: Research on Underrepresentation. The MIT Press, Cambridge (2006)
11. Beyer, H., Holtzblatt, K.: Contextual Design - Defining Customer-Centered Systems. Morgan Kaufmann Publisher, San Francisco (1998)

12. Creswell, J.: Qualitative Inquiry and Research Design: Choosing Among Five Approaches. SAGE Publishing, California (2007)
13. Rogers, Y., Sharp, H., Preece, J.: Interaction Design: Beyond Human-Computer Interaction. Wiley, Sussex (2011)
14. Schuler, D., Namioka, A.: Participatory Design: Principles and Practices. Lawrence Erlbaum Associates, Hillsdale (1993)
15. Larson, R., Csikszentmihalyi, M.: The experience sampling method. In: New Directions for Methodology of Social and Behavioral Science, vol. 15, pp. 41–56 (1983)