Research on Participatory Methods for Digital Communities: Taking Map Design as an Example

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Abstract. This study proposes a participatory design method for digital communities and explores its application in community construction and digital cultural dissemination. Taking community map design as an example, by combining digital tools and participatory methods, the aim is to promote active participation among residents and enhance their sense of identity and belonging in the community. This article provides a detailed introduction to the theoretical basis, design process, and method evaluation of this method, and proposes future research recommendations to further improve and promote this method.

Keywords: Community Culture, Digital Community, Participatory Design

1 Introduction

1.1 Background and Significance

With the development of digital technology, digital communities have become a trend in the development of new communities, and the way information is disseminated and the mode of social interaction has changed [1]. These virtual spaces not only provide convenient communication channels, but also shape new social relationships and forms of interaction. However, despite the enormous potential of digital communities in enhancing social connections and information sharing, residents' participation in community affairs still mainly relies on traditional offline forms. This one-way and traditional way of participation is no longer able to meet the diverse needs and expectations of society.

Maps are carriers of geography and culture, closely related to residents. However, traditional map design is usually led by experts, and community members lack effective participation and feedback, resulting in maps being difficult to reflect actual needs and cultural characteristics. [2]. The community hopes that residents can play a more active role in map design, by expressing their own opinions and experiences, reflecting real life scenes and needs, and enhancing their sense of belonging and identification with the community [3].

The participatory approach for digital communities is studied from the perspective of map design. By introducing digital tools and feedback mechanisms, online partici-

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pation can be made more flexible and dynamic, thus better serving community construction and digital cultural dissemination, and providing a better path for residents to assist in community affairs in the future.

1.2 Research Questions and Objectives

This study aims to answer the following questions:

How to design a participation method that adapts to digital communities?

What are the benefits of this method for the community in practice?

2 Theoretical Basis

2.1 Participatory Design Theory

Participatory design originated in the 1970s and was initially used in industry and trade union movements to improve work environments and production processes through direct employee participation [4]. Participatory design enhances the democracy and effectiveness of design by involving workers in the design and decision-making process, and is more in line with the actual needs and interests of workers [5]. Nowadays, participatory design, as a user centered design method, ensures that the design results better meet the actual needs and expectations of users by mobilizing their active participation [6].

2.2 Digital Community and Map Design

Digital community refers to a virtual community formed through the Internet and digital technology, which is characterized by real-time interaction, resource sharing and high connectivity [7]. Digital communities provide convenient communication spaces where social relationships can be established and maintained through forms of interaction such as text and voice. Secondly, information dissemination in digital communities is rapid, and members are usually able to quickly access the latest information, thus participating in community affairs in a timely manner [8].

In the dissemination of digital culture, maps have gradually transformed from traditional geographical tools into a multidimensional form of cultural and social expression. Through participatory design methods, maps are transformed from products independently created by designers to cultural products co created in a bottom-up manner. This method encourages community members to share their life experiences and insights, enhances the authenticity and practicality of the map, and allows for a profound sense of belonging and identity [9].

3 Participatory Map Design Method for Digital Communities

3.1 Overview of Methods

This study proposes a participatory map design method for digital communities, which

combines advanced digital tools and effective participation mechanisms to enhance community members' sense of participation and improve the accuracy and practicality of map design. This method involves introducing participatory design and real-time feedback mechanisms, while utilizing digital tools such as geographic information system (GIS) technology and LARK to involve members in the map design process. These tools not only provide easy-to-use interfaces and features, but also support multiple participation methods such as online discussions, voting, and real-time editing, making the participation process more interactive.

3.2 Case Background

This study selects a digital community in Shengzhou City, Zhejiang Province as the research object. Shengzhou City is a city with rich historical and cultural heritage, and with the development of the city, multiple communities have active online platforms. This community covers different ages and social backgrounds, representing a typical structure in the city. Residents communicate through social media and mobile applications, and have a high sense of participation in the community's infrastructure and cultural activities, providing a good foundation for participatory map design.

3.3 Implementation Process

Requirement Analysis Stage. Continuously collect behavioral data and interaction information of community members through digital channels such as community platforms and social media. By using big data analysis tools to process and mine data, identify the demand trends and behavior patterns of community members. In the needs analysis of Shengzhou community, it was found that the demand for maps mainly focuses on annotating commonly used public facilities and important landmarks, reflecting local culture and history, and enhancing the community's cultural identity.The following Table 1 summarizes the community information.

Table 1. Analysis of Community Needs and Behavioral Patterns.

Summary	Information	Research Conclusions
Population Statistics	Age: 25-40 years old(45%) Income level: Middle income(60%)	Mainly for the middle-income group aged 25-40
Venue Use	Taking the park as an example： the daily passenger flow(300) the flow on weekends(600)	Parks, convenience stores, and other convenient places are frequently used
Participation in Cultural Activities	Market Participation : 60% Cultural activity participation :40% Community participation : 30%	Market cultural activities have a high level of participation, while community affairs are relatively low
Communication Content/Frequency	Interactive theme: Public facilities, cultural activities Active users: 100 people per day	Mainly discussing public facilities and cultural activities

User participation in the design phase. Based on big data analysis of community needs and behavior patterns, the design team has chosen "community convenience points" as the theme for map design, guiding residents to participate in the design through the online platform LARK. Firstly, each participant shares what they have seen and heard in the community, including convenient facilities and problems encountered. Subsequently, a brainstorming session was conducted to list convenient locations within the community. Each participant selected 1-2 locations and drew them based on their actual experience, ultimately forming a simple information map about the community's convenient facilities (see Fig. 1).

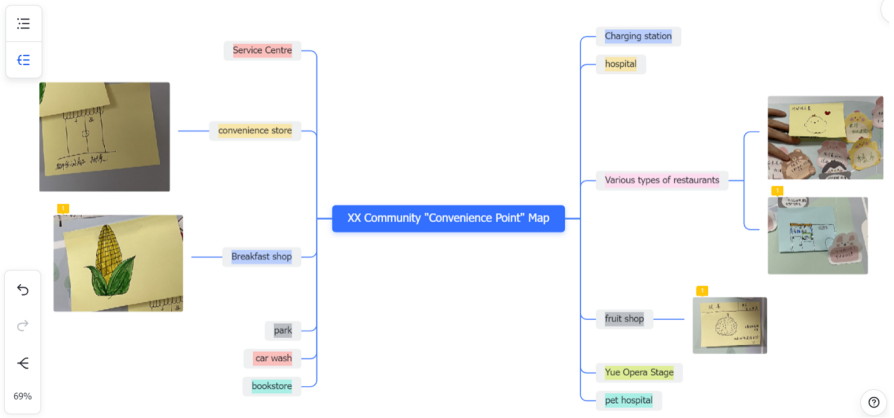

Fig. 1. Brainstorming for Convenience.

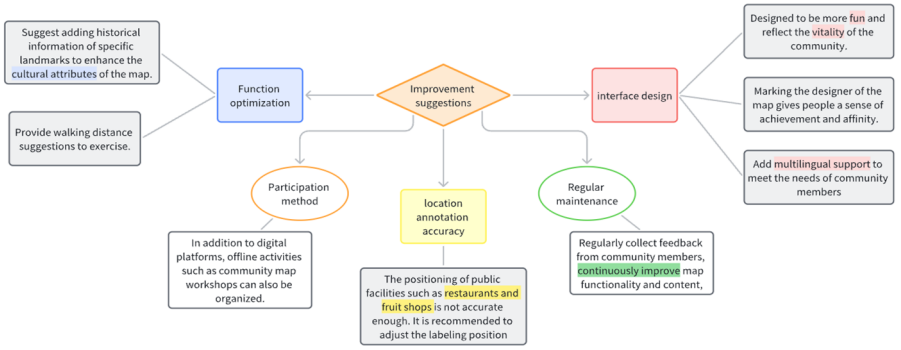

Fig. 2. Feedback from Residents.

Community Feedback Stage. Using LARK to set up a dedicated feedback channel that supports various forms of feedback, including text, images, etc., real-time monitoring of community members' questions and suggestions, and using big data and artificial intelligence technology for automated screening and classification, suggestions on functional optimization, location annotation accuracy, interface design, etc. have been screened out. Take quick action based on the classification results, solve problems

or adopt suggestions, and provide timely feedback on progress and results. To establish a feedback loop, continuously optimize community management and service quality, and enhance the sense of participation and satisfaction of community members (see Fig. 2).

Final Design Phase. After several revisions, the design team released an optimized version of the map and deployed it throughout the community for residents to test and use. During this process, community members were invited to experience the map and provide feedback on their usage experience through surveys, online platform communication, and other means. The following Fig. 3 gives the final map.

Fig. 3. Final Map.

4 Assessment and Conclusion

4.1 Method Evaluation

By analyzing the feedback on the LARK platform, the willingness of community members to participate shows an upward trend as the activity progresses, reaching its highest point in the map participation design stage. However, as we entered the feedback and testing phase, participation slightly decreased. Further comparing the data before and after the activity, although the participation rate during the testing phase slightly decreased, the majority of residents generally showed an increase in their willingness to participate after participating in the activity (see Table 2).

Table 2. Resident Participation Intention Form.

	Requirement Analysis	User Participation	Community Feedback
Willingness to Participate before the Event	Very willing (60%) More willing (30%) Not willing (10%)	Very willing (70%) More willing (25%) Not willing (5%)	Very willing (65%) More willing (30%) Not willing (5%)

Participation	rate (60%)	rate （85%）	rate （70%）
Willingness to Participate after the Event	Very willing (70%) More willing (25%) Not willing (5%)	Very willing (85%) More willing (15%) Not willing (0%)	Very willing (75%) More willing (20%) Not willing (5%)

In summary, utilizing the LARK digital platform for participatory design activities has a significant effect on enhancing residents' enthusiasm for community participation. However, while online platforms improve collaboration efficiency and participation breadth, they may experience a decrease in participation sustainability due to time or technological barriers, which can affect residents' enthusiasm for participating in community activities. When optimizing this method in the future, it is necessary to further consider how to lower the technical threshold and combine offline activities to strengthen deep interaction among community members.

4.2 Main Conclusions

In this study, it was found that the introduction of participatory design and real-time feedback mechanisms on digital platforms can significantly improve the participation and satisfaction of members in community affairs in digital communities, thereby enhancing residents' sense of community identity. Community members actively participated in the map design process through the digital platform LARK, which not only enhanced interactivity but also ensured that the design was more in line with community needs. Overall, the study confirms the effectiveness of this participatory design approach that combines digital tools and feedback mechanisms in enhancing user engagement in digital communities.

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