Analysis of Digital Divide Problems Faced by Middle-aged and Elderly Population in Shaanxi Province

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Abstract: In the new era, the digital society intelligent management empowered by high-tech technology has been integrated into people life, but the problem of digital divide caused by the non-homogeneous spread of the Internet has become more prominent, especially among middle-aged and elderly individuals. Based on this, this paper takes Xi'an and Xianyang City in Northwest China as examples, according to digital divide theory, designs a questionnaire to investigate. Through the cross-analysis, it can be seen that age, family support, and social assistance are key factors that contribute to the usage gap and knowledge gap for middle-aged and elderly people. Based on this, this paper puts forward the following suggestion: first, encourage enterprises to design age-friendly applications; second, provide social support for elderly; third, enhance the learning ability of the middle-aged and elderly by categorized training.

Keywords: Middle-aged and Elderly Digital Divide; Northwest China; Digital Divide; Questionnaire Research

1. Introduction

The unstoppable development of digital technology has become a focal point in society. In 2018, the National Rural Revitalization Strategic Plan (2018-2022) was announced, and digital empowerment was introduced into the process of rural development. Significant improvements have been made in the digital infrastructure of both urban and rural areas in China to date, and digital development has been increasingly emphasized at the national policy level, becoming an important element of China high-quality development in the new era. However, due to the lack of digital media, learning resources and learning capabilities, Middle-aged and elderly people are gradually marginalized.

In 2022, the State promulgated the Action Plan for the Development of Digital Villages (2022-2025), which emphasizes on improving the level of information services for special populations and calls for digital upgrading for the elderly. In this context, the question of digital divide in the middle-aged and the elderly has been the focus of academics, but most research focuses on institutional design and infrastructure construction, rather than analyzing from a personal perspective. Based on this, this paper takes Xi'an and Xian yang City in Northwest China as examples, according to Digital divide theory to designs a questionnaire, and through the cross-analysis to explore the path.

2. Literature Review

The term "digital divide" first appeared in 1990 in the American scholar Erwin Toffler's The Shift of Power. In the existing research, academics mainly study from the following aspects.

2.1 The "Access Gap" Dilemma

In the 1990s, with the development of digital media and information and communication technology (ICT), the Gaps in access and usage in digital media gradually aroused social concern, which caused the access gap. The coverage of smartphones and broadband network services tends to decline with age, influenced by factors such as regional economic development, income gaps, and comprehensive quality life [1].

There are many factors influencing the differences in digital access, and many studies focus on the differences in opportunities for different social groups to access Internet devices and digital information resources and services. For example, Yang Yifan and Pan Junhao proposed that due to the imbalance of the degree of economic and social

development between urban and rural areas, and the difference in the priority of the national information technology development strategy, different subjects are faced with inequality in access to technological opportunities and costs[2];   Jia Yujiao and Wang Cong suggests that there is a dichotomy between the elderly and new technologies due to structural mismatch in human-technology interactions, and that there is an urgent need to analyze the tension between population aging and technological change to bridge the gap between technology and people [3].

2.2 The "Use Gap" Dilemma

With the development of Internet information technology, the gap between information-rich and information-poor groups has become increasingly obvious. Access to digital devices is only the first step to integrate into the information age.   The difference in ability of different subjects to use digital technology further the existence of the use gap.

The digital usage gap is mainly composed of cultural, technological, individual, and individual-social structure levels [4]. At the cultural level, the stereotype of the elderly as weak, slow, stubborn, and conservative not only lowers the self-evaluation of the elderly but also   ignores their needs; weak usage skills and the unfriendly designed app amplify the impact on the digital usage divide. On the whole, the use gap not only limits the elderly' ability to access information, but also affects them to take part in the public activities.

2.3 Knowledge Gap Theory

Unlike the traditional digital divide theory, which focuses on the access and use of digital technology [5], the gap theory mainly analyzes the social different consequences in Internet access and use. According to the "knowledge gap" theory, there is a significant positive correlation between knowledge acquisition and economic status [5];

According to the "knowledge gap" theory, most middle-aged and elderly people with poor learning ability and relatively vulnerable position are unable to timely access to the latest digital technology information, and thus fall into a digital dilemma in the progress of technological development. Wang ye points out that the knowledge gap is the superposition of the access gap and the use gap, leading to inequality in the distribution of digital dividends [6]. This is crucial for understanding the phenomenon of inequality in the digital age [5].

2.4. Subjective Level Integration Dilemma of Middle-aged and Elderly People

2.4.1. Ability-environmental pressure theory

The ability-environmental pressure theory holds that at each different stage of life, individuals possess different abilities and face different environmental pressures, and that people's level of adaptation to the environment depends on the degree of matching between their personal abilities and environmental pressures [7].

For the elderly, with age, their ability to adapt to the environment is gradually declines. However, the rapid development and popularization of digital technologies have disrupted the balance between the elderly abilities and their environment, led to the lack of belonging and independence, and create feelings of rejection [8]. Seifert, A. found that this "environmental pressure" is more likely to lead to depression and anxiety, reducing the sense of well-being [9]. All these psychological emotions will further affect the elderly's enthusiasm for learning and their ability to accept.

3. Questionnaire Design and Analysis of Influencing Factors

3.1 Questionnaire Design

Based on the theory of digital divide, combined with the characteristics of the middle-aged and elderly, from perspective of demand-supply-social support, the questionnaire is designed as follows Table 1:

Table 1. Questionnaire Design Content

Competence dimension	Detail dimension index	Questionnaire item
Access Gap	The improvement of digital technology infrastructure in the region	Whether it is convenient to use electronic products in the regular residence
	Possession of personal digital devices	Whether you have a smartphone
	Personal usage frequency	How often do you use your phone

Use Gap	Usage of basic functions (e.g. basic communications)	What functions do you mainly use your mobile phone for
	"Advanced feature usage (e.g. social media, data Information government software)"	
	The ability to get information through smart devices	Government websites, government apps, wechat public accounts, etc., can let you know more useful information
	The ability to enjoy convenient services through smart devices	Handling affairs, buying things and obtaining information online are generally more time-saving and convenient than offline
Knowledge Gap Theory	Difficulties encountered in learning skills	The biggest obstacle to learning to use electronic devices is
	Difficulties encountered in obtaining information	Common problems encountered when using apps in smartphones include
	The means of seeking help when facing the dilemma of comprehensive knowledge gap	In daily life, if you encounter difficulties in the use of electronic devices, your solution is usually
Ego Needs	Interest in digital technology access	How much impact do you think digital technology has on your life
	An interest in digital learning	Are you interested in learning more about using your smartphone when you need to
	Preference for ways to learn digital technology	What is the most important way to learn to use smart devices Would you be willing to learn if there was publicity and free training

3.2 Selection of Survey Objects

The city of Shaanxi is an important provincial capital city in the northwest region of China, and its economy, culture, population and social development history have significant northwest region characteristics. According to the seventh national census, the number of people over 60 years old in Shaanxi Province reaches 7.59 million, accounting for 19.2% of the population. From the point of cities, In Xi 'an, Xianyang and Baoji, the proportion of elderly population over 60 years old is 16.02%, 22.66% and 24.31%, which is high compared to other cities in Shaanxi province, and belongs to the area of relatively serious aging. Based on this, this paper selects people over 50 years old in Xi'an and Baoji City as the survey object.

A total of 204 questionnaires were distributed and 197 questionnaires were effectively recovered, accounting for 94%. From the perspective of the gender, there are 73 men, accounting for 35.78%, and 131 women, accounting for 64.22%; from the perspective of age, there are 89 people aged 50-60, accounting for 43.63%, 50 people aged 60-70, accounting for 24.51%, and 65 people aged 70-80, accounting for 31.86%, which basically covers the elderly groups of all ages.

3.3 Analysis of the Current Situation of Survey Respondents' use of Smart Devices

3.3.1 The use of smart devices

The results show that middle-aged and elderly people use cell phone more for making phone calls, sending text messages, and accepting WeChat messages. The functions such as online medical care and payment are relatively little. The data results are shown in the figure below Figure 1:
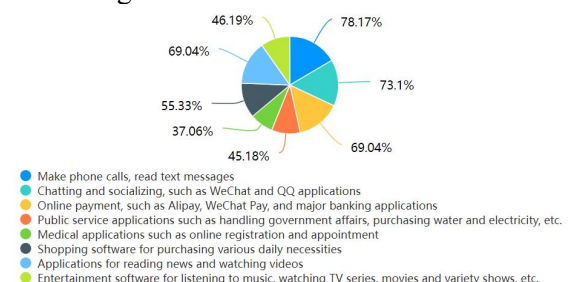
Figure 1. Uses of Smart Devices by the Elderly

3.3.2 Difficulties in the use of smart devices

According to the survey results and the icon below Figure 2, the difficulty more frequently raised are "the process is too complicated and they don't know how to operate it", accounting for 58.88%, followed by the font is too small and invisibility, accounting for 42.13%.
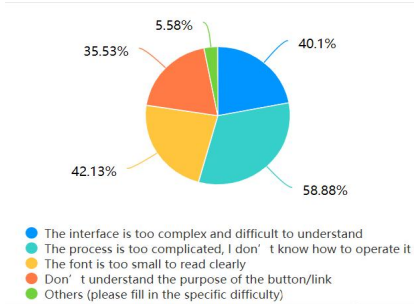
Figure 2. Performance of Middle-aged and Elderly People's Difficulties in Using Devices

3.3.3 Difficulties in learning digital skills

According to the survey results, the biggest difficulty is "Although they have been trained, they cannot remember or learn it" and "they are afraid of being cheated and don't dare to use the App", each accounting for 35.53%, followed by "Usually no one teaches them ", accounting for 28.43%. Secondly, 64.47% Survey object will seek help from their children when they do not know how to use digital devices, while 51.78% are trying to solve the problem by themself. on the whole, middle-aged and elderly people lack social support when facing digital dilemmas.

3.4. Analysis of the Influencing Factors of Digital Divide

This paper uses the one-way ANOVA test to analyze the influencing factors that cause the digital divide in the middle-aged and elderly population.

3.4.1 Influence of age

The data analysis show that age is positively correlated with the degree of dependence on seeking help from sons and daughters. In the 50 to 60 age range accounted for 57.30%, In the 60 to 70 age range accounted for 60%, In the 70 to 80 age range accounted for 79.31%. It is also found that confidence in self-learning ability and enthusiasm decreases with age. Secondly, seeking help from friends stabilizes in the range of 34%-38%. It can be seen that self-learning, seeking help from family, and seeking help from friends are the basic choices for the middle-aged and old-aged groups. The specific distribution diagram is as follows Figure 3.

3.4.2 Influence of age on interest in learning digital skills

In the questionnaire design, learning interest is divided into 5 levels. and combine the options of "average", "more interested" and "very

interested" into "willing to learn" When analyzing the data. It is clear that middle-aged and older people are generally more enthusiastic about learning digital skills regardless of age. The chart is as follows Figure 4.
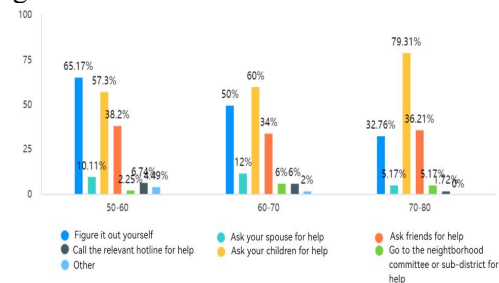
Figure 3. Pathways Chosen by Different Age Groups to Solve the Problem
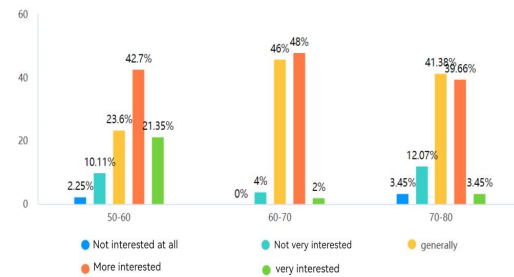
Figure 4. Enthusiasm for Learning in Different Age Groups

3.4.3 Influence of different age groups on learning styles

Cross-analysis results in the graph below Figure 5, which shows that there is a significant difference in the choice of learning paths for different age groups. In the age of 50-60, the proportion of seeking support from their children, participating the community training-program, and solving by themself are 51.69%, 34.8%, and 46.07%, respectively; among people aged 60-70, the proportion are 64%, 40%, and 30%, respectively; among people aged 70-80, the proportion are 63.79%, 34.48%, and 24.14%. The results show that "seeking help from children or friends" is the most important way for the elderly to learn digital skill, and community training is an important external support. Secondly, the elderly group shows a stronger dependence on friends and relatives when facing the digital divide, so the elderly group aged 70 and above needs more social support.

4. Conclusion and Policy Suggestions

4.1 Conclusion

The rapid development and popularization of

Internet digital technology has broken the balance between the individual ability and the environment of the elderly, resulting in a loss of independence and a sense of rejection in the elderly. Based on this, the paper takes Xi'an and Xianyang City in Northwest China as examples, according to digital divide theory, designs a questionnaire to investigate. It can be seen that age, family support, and social assistance are key factors that contribute to the usage gap and knowledge gap for middle-aged and elderly people [10]. Some conclusions are as follows:1.Age is positively correlated with the degree of dependence on seeking help from children; 2.old people   all have passions for learning digital skills regardless of age; 3. Cross-analysis shows that there is a significant difference in the choice of learning paths for different age groups.
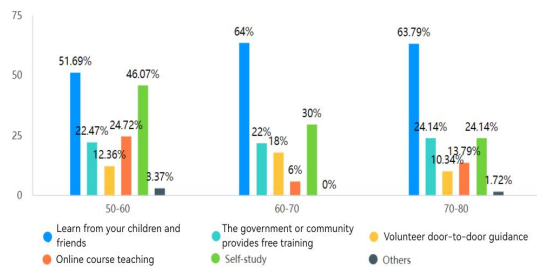
Figure 5. Choice of Learning Pathways for Different Age Groups

4.2 Policy Suggestions

In response to this dilemma, with the analysis of the questionnaire, the paper puts forward the following recommendations:

4.2.1 Encourage Enterprises to Develop Applications that are Friendly for the Elderly

In digital technologies, the application is mainly designed for young and middle-aged people which resulted the elderly group unwilling and fear to use the App [11]. Based on the needs for middle-aged and elderly, the government can provide financial subsidies to encourage enterprises to design age-friendly applications for the medical, social security, transportation and other services frequently used by middle-aged and elderly people, to solve the "Use Gap" dilemma.

4.2.2 Provide Social Support to Meet the Objective Needs of Different Elderly Groups

At present, the important way for middle-aged and elderly to solve the digital divide is to seek support from their families, but this does not fundamentally solve their learning dilemma.

As a disadvantaged group, the elderly' knowledge gap in information technology is getting wider and wider [12], bridging this gap requires the help of governments and societies [13]. Therefore, we can rely on communities, schools and enterprises, in the form of public welfare or the purchase of public services, to provide regular training for the elderly, so as to reduce the "knowledge gap" dilemma faced by the elderly, and improve their ability to adapt to social development.

4.2.3 Enhance the Learning Ability of the Middle-aged and Elderly Through Categorized Training

The survey shows the group who has different age, living conditions and monthly incomes has different ways to solve the problem of digital divide. Therefore, different assistance-programs should be designed to match different needs. For example, for the 50-65 age group, considering they have overall strong learning ability, training-program on medical care and smart transportation can be conducted regularly; for the 65 and older group, community could through cycle training, share learning materials, and designate special tutors, and so on, to improve the elderly' learning confidence and learning ability.

Acknowledgements

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