Examining the Factors Influencing Elders' Knowledge Sharing Behavior in Virtual Communities

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Abstract. The development of Information and Communication Technology (ICT) reduces the cost of communication, and the emergence of a large number of virtual communities to promote more frequent knowledge sharing behavior. However, there are still great differences in knowledge sharing behavior among different age groups in virtual communities. Through long-term observation we found that whether it is a large virtual community, such as WeChat, micro-blog, Zhihu et al., or a virtual community which is designed for the elderly, such as The lovely old man, The home of old man, Sunset Forum et al., the old people's participation and enthusiasm for knowledge sharing are not high in China. The purpose of this paper is to explore the motivation of the elderly to participate in knowledge sharing in virtual communities. We select participants through various virtual communities, and using the grounded theory to carry out conceptual analysis and coding. To understand the motivation of the elderly to participate in knowledge sharing in the virtual community, so as to provide some reference for the development of the elderly human resources.

Keywords: The elderly · Knowledge sharing · Virtual community · Grounded theory

1 Introduction

As we all know, in the late nineteenth Century, the aging of the population began to appear in some developed countries. Nowadays, the aging of population has become a global phenomenon due to the decrease of birth rate and the improvement of people's life (Lee 2003). According to "The China Statistical Yearbook 2016" released by the National Bureau of Statistics of the People's Republic of China, the number of people over the age of 65 in China reached 143 million 860 thousand by the end of 2015, accounting for about 10.5% of the total number of people in China (The China Statistical Yearbook 2016). China has become one of the most populous countries in the elderly. The traditional "negative aging" takes a large number of elder people as a burden on society, it argues that in the economic field, the aging of the population may affect economic growth, savings, consumption, investment, labor market, tax, etc., on the social level, the aging of the population may affect health care, family structure, living arrangements, housing and population mobility, etc. (Liu and Jiao 2015). However, in

the course of their lives, the elderly have accumulated a lot of valuable knowledge, experience, professional skills, social resources and wisdom. If the knowledge of the elderly can be expressed and passed on, it will not only enrich the lives of the elderly, but also bring about a sense of accomplishment, and will also play a guiding role in young people. Active aging suggested that the old man should not be regarded as a burden on society, and we should pay more attention to the discovery and excavation of the social value of the elderly. Older people can make more contributions to society.

With the rapid development and popularization of the Internet and information communication technology (ICT), it creates the space and environment of knowledge sharing. Virtual community provides users with online communication platform, such as asking questions, post sharing or discussion issues; it reduces the cost of communication. Knowledge sharing in network virtual community has become an important way to develop the social value of the elderly gradually. Worldwide, older people are the fastest growing computer and Internet user group in many cases (Wagner et al. 2010). More and more older people are beginning to integrate online media into their lives. China Internet Network Information Center (CNNIC) released the "thirty-ninth China Internet development statistics report" shows that by the end of 2016, China's Internet users reached 731 million, and mobile phone users reached 695 million, among them 60 years old and above Internet users have accounted for 29 million 240 thousand, accounting for the total number of Internet users by 4% (CNNIC 2017). It can be seen that the number of Internet users in China is very large. A large number of elderly people participate in various virtual communities, at the same time, there are many virtual communities designed for the elderly. Through long-term observation we found that the old people's participation and enthusiasm are not high. Therefore, it is necessary to study the motivation of the elderly to participate in knowledge sharing in the virtual community, which will help to develop their social value and contribution ability.

This study is based on user motivation. We conducted in-depth interviews with 21 older adults, and analyzed the motivation factors of knowledge sharing in the virtual community by using the grounded theory so as to put forward some suggestions on how to improve the participation of the elderly.

2   Literature Review

With the increase of the number of elderly people, the attention of this group is gradually increasing. Scholars in many fields have done a lot of research on the elderly. In this paper, we mainly investigate the demand for Internet, the use of virtual community and the sharing of knowledge among the elderly study. These arrangements will help us better understand the motivation of Internet knowledge sharing.

For the elderly, the growth of age leads to a series of changes in physiology and psychology. Physically, they have different degrees of hearing, vision, memory, limb activity, etc.; psychologically, they tend to suffer from anxiety, tension, depression and fear of death. In addition, old people like to be quiet but they are afraid of loneliness, and they are reluctant to accept new things and new ideas. In the face of these physiological and psychological changes, the needs of the elderly are: safety needs,

belongingness and love needs, esteem needs, self actualization needs, etc. Liu's study (2014) found that the majority of older people think that information is important to them, and a considerable number of elderly people are still willing to accept information technology. Sharit (2008) reported that health is one of the most important themes of the elderly, and using the Internet to acquire health knowledge is a demand for the elderly. He found that the knowledge structure and cognitive ability of the elderly had an impact on the acquisition of knowledge. The elderly mainly use social networks to share photos, participate in group discussions, contact old friends, keep in touch with their children and develop personal interests (Leist 2013). Some scholars study the factors that affect the use of the Internet in the elderly. Compared with older men, female participants were more familiar with the term "online social network" and used more frequently, in addition, age, gender, and education appear to be the most important factors affecting the use of activity of the elderly in the online community (Vošner et al. 2016). Old people's willingness to use the Internet will be affected by three factors: attitude, subjective norm and perceived behavior control. However, due to the differences in personality, past experience and living environment, the influence of the three factors on the willingness of the elderly to use the network is different. Among them, the use of attitude will be affected by the perceived ease of learning, perceived usefulness, trust and fear of the network; Subjective norms are mainly from children, grandchildren and peer group; Perceived behavioral control was mainly influenced by self-efficacy, perceived control, past experience, social support, and website design (Xie 2014).

Virtual community is an online collection of users with common interests or similar purposes and emotional communication with each other (Koh and Kim 2003). In the virtual community, users often discuss various topics, participate in specific activities, and establish a certain network of interpersonal relationships. Due to the support of the information technology, the virtual community has got rid of the restriction of the geographical position, which makes the scattered individuals not to meet, but also to participate in the exchange and discussion of the problem, and gradually become the platform of knowledge and information sharing. In the process of interaction, the members of the community can find out the active degree of different users in the virtual community, so as to find some positive or similar users. Similar hobbies make them feel familiar with each other, and the sense of belonging to a community may be stronger, thereby enhancing their sense of virtual community (Koh and Kim 2003). The use of virtual community has a positive impact on the elderly, especially the community forums designed for the elderly, and it can meet the needs of different elderly people. Forum members can help each other, and provide emotional support, is a new source of social support for the elderly after retirement. The elderly participate in virtual communities often hope to obtain some harvest, such as, maintain relationships with relatives and friends, get news, health and medical information, consumer information and online courses, shopping, travel and financial management, or game and cultivate virtual hobbies, etc. (Nimrod 2010). Elderly people are very willing to share their experience in the forum and blog, their community stickiness is strong, and will not easily leave a community generally. When communicating with other people in the virtual community,

the elderly prefer to use relatively formal expressions, and less use of fashionable network language (Pfeil et al. 2009).

Bouty (2000) puts forward the knowledge sharing behavior among individuals. In today's Internet environment, knowledge sharing has been widespread, people are accustomed to sharing fragmentation knowledge in a variety of virtual communities. Zhou (2015) compared the differences of different user groups in the virtual community, and finds that compared with the elderly, young people have higher expected returns and self-efficacy. However, there is no significant difference in knowledge sharing. It indicating that the elderly are eager to knowledge sharing behavior, and their expectations of returns is lower than that of young people, which is very useful for the development of the elderly human resources. Chen and Hung (2010) divided the factors that affect the individual knowledge sharing into two categories: individual cognitive factors and environmental factors. The former includes personal traits and attitudes, such as expert sense, reputation, self-efficacy and internal motivation; The latter is mainly the virtual community environment, such as the rules of the community, the location of the nodes in the network, the social interaction with other users and community participation etc.

Through the collation and analysis of relevant research, we initially summarized the initial motivation model for the elderly to participate in the virtual community knowledge sharing, as shown in Fig. 1:
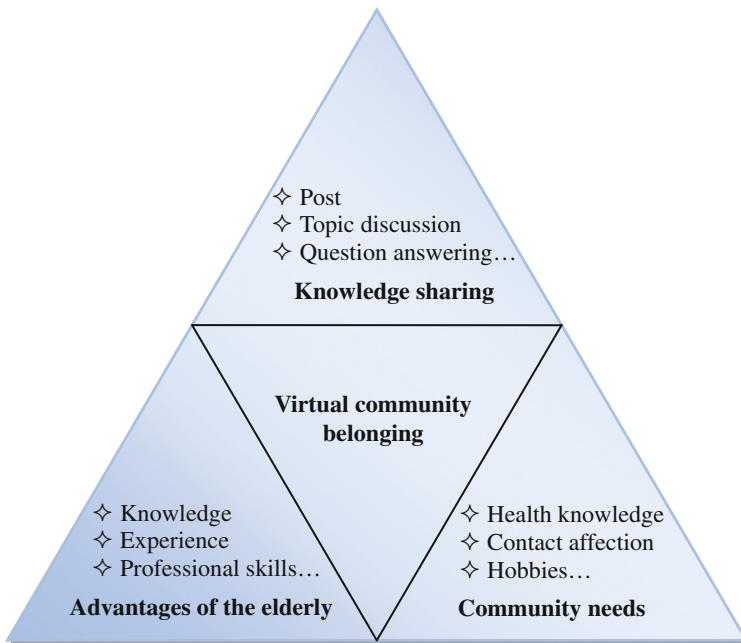

Fig. 1. Initial motivation model for the elderly to participate in knowledge sharing

To sum up, at present, many scholars have done a lot of research on the elderly. The research on the Internet demand and the use of virtual community has been a certain

foundation, but there is less research on the knowledge sharing of the elderly. In this paper, we study the motivation of the elderly to participate in the virtual community knowledge sharing, which will have a certain significance for the effective development of the elderly human resources.

3   Research Design

3.1   Methods

A grounded theory methodology was chosen for the qualitative analysis because it is a highly structured method of inquiry and is well established (Bisogni et al. 2012; Ponterotto 2005; Lovell 2016). In this study, we employed the grounded theory methodology to explore the motivation of knowledge sharing among the elderly in the virtual community for two main reasons. (a) Although there are many researches on knowledge sharing, there is little research on the motivation of knowledge sharing among the elderly in the virtual community. So, there are many issues worthy of further analysis, suitable for qualitative research methods to carry out exploratory research. (b) The development of the aged human resources is a new research direction, and the most direct method is to access the data from the interview for qualitative analysis. This study adopted the Strauss (1990) analysis method, the method step by step through open coding, axial coding and selective coding analysis data, until the concept is saturated(Heath and Cowley 2004).

3.2   Participants

Now generally defines people over the age of 65 as the elder. Prior studies have shown that internet and broadband use drops off significantly after age 75 (Zickuhr and Madden 2012). Therefore, the elderly aged between 65–75 years old were selected as the subjects. According to data presented in Fig. 2, from the recruitment of participants to finish data collecting, we totally used 45 days. First, we posted in various elderly virtual communities for recruiting participants. About two weeks later, we received a response from the 43 volunteers to show that they were willing to participate in the study. Second, we emailed the volunteers with some survey questions (such as how old are you? How many years of knowledge sharing experience have you had in the virtual community? etc.) Eligibility based on: (a) age 65–75 years, (b) volunteers who experienced in knowledge sharing in the virtual community for more than one year, (c) fluent in Mandarin. A total of 43 questionnaires were distributed, and 41 questionnaires were returned, of which 12 persons less than 65 years old and 5 persons lack of knowledge sharing experience. Of 24 participants, 21 got in touch with, while 3 persons were not contacted. Third, we conducted semi-structured in-depth interviews of the 21 participants, each interview lasted between 30 and 50 min in length, the purpose of interview is primarily to explore the elder's cognition degree of knowledge sharing in virtual community, and the motivations for knowledge sharing. Hence, data from 21 interview records were analyzed.
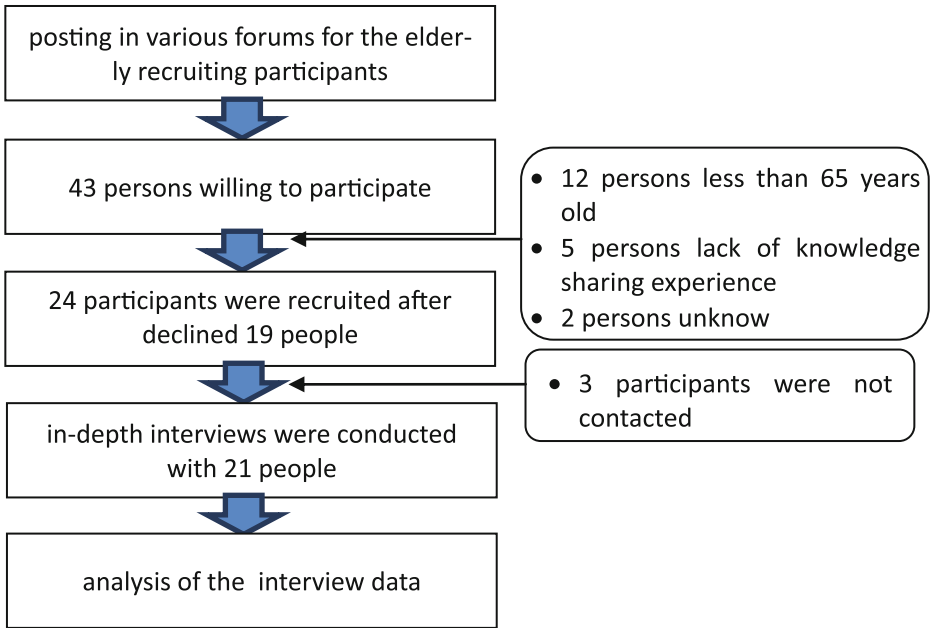
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Fig. 2. Flowchart indicating sampling for the study.

4   Data Analysis

4.1   Open Coding

Open coding is the process of breaking dawn, examining, comparing, conceptualizing and categorising data. This process of coding yields concepts, which are later to be grouped and turned into categories (Strauss and Corbin 1990). Analysis began with open coding by the manual, which involved the identification of raw statement units, small sections of text representing a certain idea or concept (Strauss and Corbin 1990). 21 interview records for a total of 38714 words. Due to the large number of initial concepts, and there is a certain degree of cross duplication, we have to make some consolidation. We merged repeat crossover concepts, and excluded the concept which repeated less than 3 times. Consequently, 15 concepts were proposed (Table 1).

Table 1. Open coding interview and dimension

Concepts	Explanation	Raw data examples
The sense of honor	The elderly can feel honorable through knowledge sharing in virtual community	"Others often praise highly of my writing, I feel very proud."
Improve the reputation	Knowledge sharing can improve the reputation in the virtual community	"I spent two years as the moderator of the forum, and I already have more than and 100 fans."
Self-realization	Knowledge sharing makes old people feel their value	"I don't feel old, my brain is still very young, I hope I can help more people with what I can, and realize the value of my own life."
Helping others	In order to help others to share knowledge	
Active community	To share knowledge in order to make virtual community more active	"Sometimes I feel lonely when I at home,…I would like to share knowledge on internet, some people would actively participate in"
Interest	Share knowledge of interest	"I like to tell everybody what I know."
Make friends	Knowledge sharing in virtual community is to meet people with similar interests	"Our forum has many old man who likes to sing. We like communicate with each other."
Acquire knowledge	Knowledge sharing is to gain more knowledge from others	"I am interested in history, I like to post comments on historical events, and then cause others to discuss, I will learn sth."
Get help	Knowledge sharing is to get the help of others in the future	"One day, my flower is ill, I don't know how to do,…As a result, my friends in the forum helped me."
Material reward	Sharing knowledge will get material rewards	"1000 points can be exchanged for 10 online shopping coupons."
Collection	Write the knowledge to facilitate the future view	"I like to write out what I know, afraid of forget in the future."
Interaction with others	Knowledge sharing can interact with others on the content sharing	"Interact with others let me not feel lonely"
Game design	Game design can encourage the elderly to knowledge sharing	"I ranked fifth now; I want to squeeze into the top three next week."
Sense of ritual	Sense of ritual can encourage the elderly to knowledge sharing	"A bunch of people to discuss a problem in the BBS, feeling like a workshop on major issues."
Peer influence	Peer influence can encourage the elderly to knowledge sharing	"Many friends around me is here to share all kinds of knowledge."

4.2 Axial Coding

Axial coding based on open coding, both the function are different, but not completely independent, sometimes the relationship between the concepts can emerge in the open coding. Axial coding is a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories. This is done by linking codes to contexts, to consequences, to patterns of interaction, and to causes (Strauss and Corbin 1990). In general, we through two ways for axial coding: (a) Interviewees directly describe categories, (b) researchers based on the analysis of the conceptual. Because the interviewees of this study are elders whose Chinese tends toward the colloquial, this study focuses on using the second method.

During axial coding we identified the relationships between initial concepts into categories and to sort similar categories into summary categories. The categories include satisfaction, sense of mission, enjoyment, resource exchange, the expected benefits, virtual community design, peer influence. And the summary categories included psychological motivation, cognitive motivation, and external motivation. Summary categories, categories and concepts are shown in Table 2.

Table 2. Axial coding results

Summary categories	Categories	Concepts
Psychological motivation	Satisfaction	The sense of honor
		Improve the reputation
		Self-realization
	Sense of mission	Helping others
		Active community
	Enjoyment	Interest
		Make friends
Cognitive motivation	Resource exchange	Acquire knowledge
		Get help
	The expected benefits	Material reward
		Collection
		Interaction with others
External motivation	Virtual community design	Game design
		Sense of ritual
	Peer influence	Peer influence

4.3   Selective Coding

Selective coding is the procedure of selecting the core strategy, systemically relating it to other categories validating those relationships, and filling in categories that need future refinement and development. A core category is the central or focus around which all other categories are integrated (Strauss and Corbin 1990). The purpose of this study is to explore the motivations of the elderly knowledge sharing in virtual community; the core category is what motivations will make old people for knowledge sharing. Therefore, this study put the "elders' knowledge sharing in virtual communities" as the core category. The structure of the summary categories is shown in Table 3.

Table 3.   The structure of the summary categories

Relationship		Relational structure	Explanation
Psychological Motivation	Knowledge Sharing	Causality	The elderly get satisfaction, a sense of mission and enjoyable when using the virtual community is the psychological motivation for knowledge sharing, which is the intrinsic motivation for knowledge sharing.
Cognitive Motivation	Knowledge Sharing	Causality	and expected benefits when using virtual community is the cognitive motivation for knowledge sharing, which is the intrinsic motivation for knowledge sharing.
External Motivation	Knowledge Sharing	Causality	The design of virtual community and peer influence is the external motivation for the elderly to share knowledge
External Motivation	Knowledge Sharing	Mediated	The design of the virtual community and peer influence will directly affect the elders' cognition for knowledge sharing, and then affect their knowledge sharing behavior.

Based on grounded theory research results, we can found that the psychological motivation, cognitive motivation, and external motivation would affect elders' knowledge sharing behavior in virtual communities together. Hence, on this basis we proposed the theoretical model which indicates the motivation of knowledge sharing among elders in virtual communities (Fig. 2). However, the theoretical model was based solely on interview data and not on previous theoretical structure. This is also the deficiency of this study (Fig. 3).
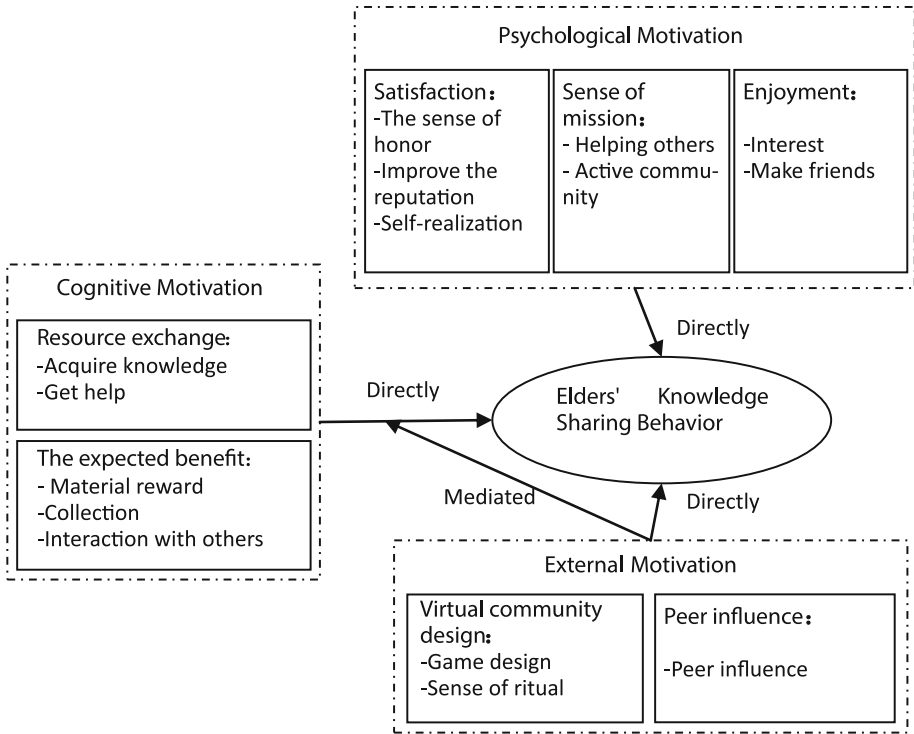
Fig. 3. Theoretical model

5   Discussion

According to social cognitive theory and motivation theory, individuals tend to partic-
ipate in the activity which may bring benefits. Elders' motivation in knowledge sharing
is explored from the perspective of inherent motivation in participation including
psychological and cognitive motivation as well as other external factors supporting or
encouraging participation. Based on the data analysis in part 4, some key research
findings have been drawn from the analysis.

5.1   Psychological Motivation

This study found that the elders' motivation of knowledge sharing is not much different
from that of young people. For example, sense of honor, improve the reputation, Self-
realization, make friends or just for fun. Among all the 21 participants, there were
13(62%) elders mentioned they hope to realize self-value, and 8(38%) elders said they
want to try their best to help others, show that older people tend to contribute to society
and others, and then helpful to their self-realization. The discovery provides a reference
for the realization of active aging and the development of elderly human resources.
Moreover, 11(52%) elders expressed the reason they do knowledge sharing is to make

friends, and 5(24%) to active community. The data shows that most old people are afraid of loneliness; on the contrary, they like a lively atmosphere and more like-minded friends. Based on the above psychological motivations, knowledge sharing in virtual communities can bring the elder contentment and entertainment.

5.2   Cognitive Motivation

Cognitive motivation refers to the elderly based on their own understanding and consideration of the participation of knowledge sharing motivation in virtual communities, this part of the motivation mainly include resource exchange and the expected benefits. There were 5(24%) elders expressed they shared knowledge in the virtual communities because they could acquire more knowledge from the comments, and 3(14%) is to get help in the future. On the one hand, if you want to get more knowledge in a certain field, you must first launch related topic for others to discuss; on the other hand, ordinarily, people give back (reciprocate) the kind of treatment they have received from another, this is called reciprocity that is a social rule that says people should repay, hence, most of the participants thought they actively help others to solve the problem, others would repay. Moreover, 4 participants mentioned material reward, show that the elders keen on gaining petty advantages. And 10 participants said they like to interact with others, mapping out the elders were very lonely generally.

5.3   Extrinsic Motivation

Extrinsic motivation refers to the elderly to stimulate inspired by external factors involved in virtual community knowledge sharing motives, this part mainly includes virtual community design and peer influence. 6(28.5%) participants said the design of the virtual communities, such as leaderboards, badges, and points, etc. drives of motivational of knowledge sharing. In other words, the traditional game elements can affect elders' knowledge sharing in virtual communities positively. Furthermore, it is worth noting that 3(14.3%) participants referred to the virtual community bring them sense of rituals is their motivation for knowledge sharing. For example, they have hundreds of fans call them teacher, whenever the Chinese New Year or other holidays these fans will give their blessing. In other words, the sense of rituals makes the elders have high self-esteem. Last, peer influence also a very important motivation for elders to share knowledge in virtual communities.

6   Conclusion

In summary, our goal was to investigate the motivational affordances of elders' knowledge sharing in virtual communities. We use the in-depth interviews to get the data and use the qualitative grounded theory method to analyze it. In fact, many elder people have rich experience and wisdom, which is a valuable asset, can effectively help solve the shortage of human resources in China. As an aging country, both academic and business must pay close attention to this problem.

However, our study was not without limitations. The motivational theoretical model was based solely on interview data and not on previous theoretical structure. Furthermore, its underlying motivational affordances were not addressed. In future work, we will conduct some quantitative studies to extend and validate our findings.

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