

# How Intergenerational Communication affects Elder Digital Heritage Awareness: A Mixed Method Approach

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**Abstract.** There is now the global phenomenon of an aging society and elders are taking up a greater part of our population. As the older adults in our society are growing in digital literacy, which is the ability to operate digital technologies, there is a rising need to manage digital assets that they leave behind. This study uses a mixed methods approach of MDPQ-16 questionnaire and semi-structured interviews to investigate the affecting factors of digital literacy and legacy. The questionnaire was administered to a sample of 34 older adults, and semi-structured interviews were conducted with two elders. This study focuses on factors contributing to the awareness of digital legacy and raises understanding of barriers in recognizing our digital afterlife in an aging society.

**Keywords:** digital heritage; digital literacy; digital assets; elders; digital immigrants.

## 1. Introduction

There is now the global phenomenon of an aging society and elders are taking up a greater part of our population. As the older adults in our society are growing in digital literacy, which is the ability to operate digital technologies, there is a rising need to manage digital assets that they leave behind [1]. These digital assets, including pictures, videos, files, and other digital artefacts, are digital legacies. Since most information today is stored in password-protected hard disks or cloud, the lack of awareness to manage digital legacies can lead to the family and descendants of the deceased losing access to all digital assets of the individual [2]. It is only when the concept of digital legacy is promoted that we are able to memorialize the deceased better in a digital age. Therefore, this study investigates factors contributing to the awareness of digital legacy and raises understanding of barriers in recognizing our digital afterlife in an aging society. This study can also help gain insight on how older adults perceive digital legacy or the value of their digital assets. As a result, there should be increasing examination of factors affecting the awareness of digital legacy in common elders, not just of those receiving palliative care. This study does not aim to arrive at a generally applicable conclusion for all Chinese urban older adults, but rather to focus on a specific case of Shanghai and a few groups of older adults.

Overall, existing studies have suggested that younger generations will increase the elder population's digital literacy and their awareness on the value of digital assets. This review inspects the factors affecting digital literacy and the level of digital legacy awareness in older digital immigrants.

## 2. Literature Review

### 2.1 Factors affecting literacy

Digital literacy is commonly regarded as the level of understanding of digital technology and the ability to manage information on the internet or digital devices such as computers and phones[1]. Although level of digital literacy can be gained through older adults' attempts at new technologies, merely basic exposure to digital devices and functions are not sufficient[3]. Schreurs et al. [1] suggests that the development of digital literacy of an individual is dependent on the support they receive, such as from younger members of the family. Other studies researching parental practices of digital devices also support this claim, finding that children have a strong influence on the parental technology use in the family[4]. Similarly, a recent study about the influencing factors on e-health

literacy in China found that elders who were responsible for taking care of grandchildren in the family had a higher e-health literacy[5].

## 2.2 Awareness of legacy

Digital legacies are any form of digital asset—photos, family movies, social media accounts—left behind when an individual passes away. While many studies focus on digital legacy, most focus on the management of digital heritage of older adults in palliative care instead of awareness of digital legacies in common elders. In these few studies, it is found that most older adults have close to no awareness regarding digital legacies. Dissanayake [6]found that 84% of the interviewed elders were not aware that digital assets could be passed down as digital heritages since they did not realize that digital objects were also valuable assets. Those who considered their digital legacies almost always pass it down to their close family members, such as daughters or sons [6]. This means that elders could better understand the value of digital assets when they are told the assets are passed to younger generations of the family[7][8]. However, among research investigating awareness of digital legacies, all of them have a western perspective. There is a lack of studies focusing on East Asian societies, or factors that may induce or prevent the awareness of digital legacies.

The review of existent literature suggests that the majority of the current research takes a public health approach towards the management of digital legacies of patients in palliative care. A minority of studies focuses on the awareness of digital legacies in common elder populations and the value of digital artefacts to elders under different circumstances. Studies indicate that younger family members can increase elders' digital literacy and affect the older adults' evaluation on the value of digital assets. However, further research needs to be conducted to determine whether the younger generation affects the older adult's awareness of digital legacy.

## 3. Method

This study uses a mixed methods approach of questionnaire and semi-structured interviews to investigate the affecting factors of digital literacy and legacy. A questionnaire was administered to a sample of 34 older adults, and semi-structured interviews were conducted with two elders.

### 3.1 Questionnaire

#### 3.1.1 Participants and Sampling Procedures

The data used for this study is acquired through a MDPQ-16 questionnaire (Roque & Boot, 2016) modified according to the general applications of digital devices in China. For example, most Chinese nationals use a SuperApp called WeChat for daily communications instead of Messages, so differences in digital device usage like this were included in the modification. Shanghai has a total population of over 24 million, with almost 15% of the population over the age of 65 (National Bureau of Statistics of China 2018). The sample (N = 34) for this questionnaire was recruited from the elder population in Pudong District in Shanghai and all the participants were between the ages of 60 to 80. Due to feasibility concerns, the participants were chosen with non-probability (purposive) sampling. Among the participants, there were 22 males and 12 females, with a range of educational levels, from primary school to master degree.

#### 3.1.2 Data Collection Procedure

The questionnaire is administered in two ways: physical copies delivered face-to-face and an online version administered on Wen Juan Xing (<https://www.wjx.cn/vm/rWb1clJ.aspx>). The research was done anonymously and did not ask for other personal information from the participants. The participants were not offered monetary incentives nor did they directly benefit from participating in the research. There are four questions of demographics in the questionnaire: age, gender, educational level, and frequency they connect with their younger family members via digital devices. The questionnaire, excluding demographics, has seven categories and a total of 23 questions regarding

device proficiency. The seven categories each address a different part of everyday usage of digital devices: Section I Basics (B), Section II Communication (C), Section III Data and File Storage (D), Section IV Services (L), Section V Entertainment (E), Section VI Privacy (P), Section VII Troubleshooting and Software Management (M). The average participant took around 8 minutes to complete the questionnaire. Many of the participants were elders who had their younger family members read and fill out the questions for them according to their oral answers.

Two elders were chosen from the volunteers who filled out the questionnaire to be interviewed. There are nineteen questions in the interview. The first three questions ask about the demographic information of the participants again: age, education level and whether or not they live with their younger generation family members. The following sixteen questions ask about the relationship between the interviewee and their family members, especially with the younger generation, and whether that affects their decisions and awareness of their digital heritage.

## 4. Findings

### 4.1 Questionnaire Data on Digital Literacy

The 34 sets of data collected from the distributed questionnaire were analyzed through two methods: correlation analysis and ANOVA (Analysis of Variance).

**Table 1.** Results of demographic /correlation

demographic /correlation	B	C	D	L	E	P	M
gender	-1	-1	-1	-1	-1	-1	-1
age	0.602471	0.974624	0.979736	0.904057	0.959066	0.883282	0.948464
contact	0.999944	0.924473	0.985177	0.941663	0.388986	0.996615	0.828339
education	0.946688	0.866025	0.840630	0.961934	0.999801	0.879979	0.646584

The correlation between each of the four demographics and digital proficiency of each section was analyzed. A significant correlation was found between the educational level demographics and digital proficiency of the participants. For the demographics of educational level, the participants' average digital proficiency score for each section (B, C, D, L, E, P, M) was sorted based on each participant's educational level. The educational level is sorted into five degrees: primary school degree (1), middle school degree (2), high school degree (3), college degree (4), and master degree or above (5). Since there is insufficient data of participants with a degree 1 and degree 5 educational level, the educational level demographic is separated into three groups. Group 1 consists of educational levels 1 and 2, group 2 is educational level 3, and group 3 is educational levels 4 and 5. The average digital proficiency was calculated for each of the three groups and used for a correlation analysis. The correlation between educational level and digital proficiency of each section is all positive, with the weakest correlation being group M (0.646) and the strongest correlation being group E (0.999). The strong positive correlation between educational level and digital proficiency means that the more educated the participants are, the more digitally literate they will likely be.

Since all participants were between the ages of 60 to 80, the data was separated into four groups based on age for analyzing correlation. Group 1 are participants between the ages of 60-64, group 2 between ages 65-69, group 3 between ages 70-74 and group 4 between ages 75-80. For the correlation analysis, the groups' average digital proficiency of each criteria (B, C, D, L, E, P, M) were calculated and compared. The weakest correlation, between group B (Basics) and age, was -0.602, and the

strongest correlation was -0.980, between group D (Data and File Storage) and age. All correlation coefficients were negative and strong, which meant the older the participants were, the lower their measured digital literacy were.

The other two demographic variables, contact with family members and gender, were analyzed using the same method. Contact, similar to education level, had a strong positive correlation with digital proficiency. To assess contact frequency, the participants were separated into three groups. Group 1 includes participants who only contact their family members once every month or less. Participants in group 2 contact their family every week, and participants in group 3 contact their family members at least three times per week. Aside from one exception, the correlation between Entertainment (E) and contact (0.389), the correlation coefficients between other criterias of digital literacy and contact are all greater than 0.800. Therefore, there is a strong positive correlation between contact with family members and digital literacy, where the more frequent the participants contact with their family, the more likely they are to have a high digital literacy. Since there are only two groups in the gender demographic — male (group 1) and female (group 2) — the correlation coefficient can only be positive or negative 1, which only shows the direction of their relationship and does not show strength. The correlation coefficients between gender and digital proficiency sections (B, C, D, L, E, P, M) are all negative 1. Female participants tend to have a lower digital literacy than male participants.

**Table 2.** Results of demographic/p-value

demographic/p-value	B	C	D	L	E	P	M
gender	0.325224	0.441534	0.149988	0.214721	0.074226	0.024347	0.29471
age	0.621068	0.076417	0.06298	0.081142	0.142031	0.322188	0.182416
contact	0.173345	0.849732	0.248932	0.791901	0.71716	0.708914	0.414879
education	0.019503	0.338913	0.202645	0.195242	0.114208	0.155027	0.424156

In a similar way, the digital proficiency of each section was divided into groups based on the four demographic variables and then analyzed for statistical significance through the ANOVA method. Same as the correlation analysis, each participant's data from the questionnaire is calculated for an average digital proficiency score for each section (B, C, D, L, E, P, M) to employ in the ANOVA analysis. For this method of analysis, the data are separated into groups for each of the four demographic variables. The gender demographic is the same, separated into two groups: male and female. The age demographic is separated into participants below and above the age of 70. The demographic of contact frequency with family members is divided into the same three groups as used in the correlation analysis: participants who contact once every month or less, ones who contact every week, and ones that contact over three times per week. In China, there is a requirement of nine years of mandatory education (until middle school diploma) now, so the education demographic is split into two groups of participants with (groups 3, 4 & 5) and without a highschool education (groups 1 & 2). The data of each digital literacy category was divided into groups for each demographic and analyzed for statistically significant differences. A p value of less than 0.05 means that differences between the data in the divided groups are considered statistically significant.

Among all the p values for the ANOVA analysis of each demographic and each category within digital literacy, there are only two data sets where the value is lower than 0.05. The first is the analysis of the Privacy (P) digital literacy data, divided into two groups based on the gender demographic, resulting with a p value of 0.0243. The second is the analysis of the Basics (B) section data of digital literacy with groups separated based on education level, where  $p = 0.0195$ .

For the analysis of the P section values divided based on gender, the data shows that group 1 (male participants) have significantly higher privacy digital proficiency score than group 2 (female participants). This significance in variation supported by the p value means that male participants have much higher awareness about protecting their digital information than female participants.

The B section data divided based on education level shows that group 1 (participants without high school diploma) have a lower basic digital literacy than group 2 (participants with a high school diploma or higher). The low p value indicates that this difference is statistically significant, suggesting that participants who go beyond the nine years of mandatory education have a higher level of basic digital literacy.

## 4.2 Interview Analysis and Digital Heritage Awareness

The interview questions consisted of two main categories. The participants were first asked about their digital literacy and frequency of interactions with digital devices; The second section asks about the interviewee's attitude towards digital assets and their digital heritage awareness. Throughout the interview, many common themes are shared between the experience of the elders.

### 4.2.1 Level of digital literacy and usage of electronics

This category asks about frequency and ways the respondent uses electronics. The respondents to this interview did not have a high digital literacy level yet there were many similarities in their experience with digital devices:

*Interviewee 1: I rarely use any devices, maybe sometimes my phone... I just use it to send messages, or read the news. Just that. I don't really use it for anything else... probably once every few days.*

*Interviewee 2: I don't use it a lot, not that frequently... to make calls, to read the news... to text people, take pictures... uh, I also use Wechat. [I use my phone] around two to three times a day.*

These digital literacy skills, in both respondents' case, were the results of the education or help of the younger generation in the family.

*Interviewee 1: [The younger generation family members] do teach me when I need to use the device... The easy things they don't need to teach me. They help me on the harder things hand-by-hand.*

*Interviewee 2: Yeah, they do teach me... How to use Wechat, how to text people, these are all things they taught me.*

To summarize, both elders have a basic knowledge on digital usage, which came from the teaching of the younger family members, and apply digital technology in limited areas of their lives.

### 4.2.2 Attitude towards digital assets and digital heritage awareness

Since the interviewees employ digital technology in their daily lives, it is evident that they own an amount of digital assets, such as chat records, pictures, files and documents, social media accounts. This section of the interview inspects the elder's recognition of the value of digital assets and management of their digital legacies.

*Interviewer: Among all of your digital assets and devices, are there any that you feel like are very important to you personally?*

*Interviewee 1: Hmm... this is a hard question to answer. I don't really have any files, but I do have some photos, and they are very precious to me. It's quite interesting to look at them once in a while.*

*Interviewee 2: There are quite a lot of photos that were taken when we were on vacation. It's saved in my phone, so I can look at it when I have spare time. It's best to save it there in case I lose it.*

*Interviewer: Are there any files or data that are very private to you, ones that you will not like to show to others or will protect with a password?*

*Interviewee 1: I don't have anything that's private and I've never considered using a password.*

*Interviewer 2: No. Nothing. There's not really anything to keep secret from my family or friends. I've never thought about using a password. I don't think there is a need for me to do that.*

Although both respondents admitted the existence of digital assets that are valuable to them, such as family photos, neither of them have considered setting a password. This lack of protection shows that neither respondent truly recognizes digital objects as assets.

Following the questions about their attitude towards digital assets, the interviewees were asked about their plans for their digital heritage.

*Interviewer: Are there any digital assets you will want to leave behind for your children and grandchildren?*

*Interviewee 1: I don't think I will. Not right now, no. If there is something they need, they can just use it, but I don't think I will purposefully leave anything.*

*Interviewee 2: I don't think there's anything I need to leave to them. I haven't thought about it yet.*

*Interviewer: Are there any data or files you wish to destroy or keep secret after you pass away?*

*Interviewee 1: I think it's better to destroy them. Best not to show them to anyone. Well, once it gets longer, no one will look at them anyways.*

*Interviewer: Are there any passwords or files that you feel you need to share with your family before you pass away?*

*Interviewee 1: Ah... I've never really thought about this. Maybe some simple ones.*

*Interviewee 2: No. Not really.*

Through this conversation, it is obvious that both elders have given little consideration to the management of their digital legacy. Especially interviewee 1, who assumed that her family members will automatically gain access to her digital assets after she passes away. Here, it shows that the elders, in general, do not have enough knowledge on how to manage their digital heritage or what would happen to the digital assets if they do not manage them.

In the following questions, the respondents were asked if they had previously been aware of the concept "digital heritage":

*Interviewee 1: No. I've never considered this previously.*

*Interviewee 2: No, I haven't thought of this before.*

*Interviewer: Do you think your interaction with your children and grandchildren will lead you to think more about these questions?*

*Interviewee 1: I interact with them quite a lot, but I don't really consider leaving these things behind to them.*

*Interviewee 2: I don't think it will. These digital assets, it's not very important to me.*

In conclusion, the elders have a low digital heritage awareness and although they view certain digital assets as precious to them, they have never considered passing those digital objects down. At the same time, they agree that their interaction with younger generation family members has minimal impact on their digital heritage awareness.

One possible reason for the elders' low digital heritage awareness is the general low digital literacy of elders interviewed. As shown through the transcript, neither elder uses electronics on a frequent basis. The only functions of electronics for the interviewees are to read news and contact friends and families. The participants do not regularly use electronic devices for entertainment or work. Thus, the low participation of digital devices in the elders' life leads to their little consideration of digital legacies.

The elder's lack of recognition of the value of digital assets also contributes to the low awareness of digital heritage. Although the participants admit that family pictures are precious to them, they do not own any files or other important personal digital assets. Unlike the younger generations, who are digital natives and use electronics for a wide range of purposes, the elders do not own many digital assets. Moreover, from the lack of intention of the participants to protect their digital devices with passwords, it is evident that they do not realize the value of their digital assets. Therefore, there is a lack of necessity in passing down their digital belongings.

## 5. Conclusion

The questionnaire data correlation analysis suggested a strong negative correlation between the gender and age demographics and digital literacy, and a strong positive correlation between education and contact level demographics and digital literacy. The ANOVA analysis shows that there are two sets of data where the variance is significant ( $p < 0.05$ ): between gender and the privacy criteria, and between education and the basics criteria.

The two interviewed elders are discovered to have a low digital literacy, rarely using technology and mostly for communication (phone calls, Wechat, etc.). Although both participants recognize that digital assets such as family photos are precious to them, they have never considered leaving a digital legacy to their children. There is a low awareness of privacy and a lack of intention to protect digital personal information/assets as neither participant feels the need for password protection. Overall, there is low awareness on digital heritage, since none of the participants have previously considered whether or not they should leave a digital legacy, and interaction with younger family members have minimal impact on the digital heritage awareness of elders.

However, there are many limitations to this study, such as the limited number of participants and the socio-economic status of the participants due to the convenience sampling. Even though the elders do not realize the importance of their digital belongings, it is still essential to raise the digital heritage awareness in the elderly population. Their lack of thought on digital legacies now could lead to their children's loss of access to precious assets after their death. From interviewee 1's words — "if there is something they need, they can just use it" — we can see that the elders have a lack of knowledge on the treatment of their digital devices after they pass away, since family members cannot automatically gain access to their digital assets without their permission. The current low awareness of digital heritage should be brought to attention and it is a necessity to promote education on digital legacies.

The relevant policy regarding digital literacy and management of digital legacy for the elderly in China is still underdeveloped. Therefore, new practice and policies can be implemented to raise digital heritage awareness within the elderly population. For example, digital assets should be included as part of lawful wills, so when elders consider their wills for physical assets, they will be more inclined to consider digital assets as well.

Future and further studies can focus on digital heritage awareness of elderly populations in different countries, since the level of digital literacy of elders will vary significantly. Future studies can also investigate how factors other than 'contact with younger generation family members' affect digital heritage awareness.

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