

Exploring Information Seeking Behavior of Digital Natives and Digital Immigrants

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【Abstract】

Digital natives and digital immigrants live in the same environment. They could be colleagues, co-workers, and family members. It is helpful to explore their information behavior not only to enhance understanding of each other, but for those who encounters with them such as supervisors, sales, teachers as well. This study aims to understand the information seeking behavior of digital natives and digital immigrants in the contexts of the workplace and everyday life. A total of 20 respondents (10 each for digital natives and digital immigrants) were recruited by purposive and snowball sampling. Semi-structured interviews and a V-R map tool were employed to collect data. Qualitative analysis of the interview transcripts was conducted for data analysis. Research results show that DIs and DNs have different information needs in everyday life, and that information needs of both DIs and DNs in work/study contexts are mostly role dependent. As for information resources used in work/study contexts and in everyday life, digital immigrants seem to depend more on physical interpersonal networks than do digital natives. Both DIs and DNs depend heavily on search engines and social networks for information seeking and disregard much high-quality information organized by digital libraries, suggesting a need for literacy education both in schools and in lifelong education programs.

Introduction

Prensky (2001) coined the terms *digital Immigrant* (DI) and *digital native* (DN) some 20 years ago to emphasize differences in technology fluency between the two groups. The Baby Boomers (born 1946-1964) and Generation X (born 1965-1980) are termed digital immigrants, while Millennials (born 1981-1996) are termed the first generation of digital natives, followed by Generation Z (born 1997-2012) and Generation α (born since 2013). Today, the adoption of and popularity of technology have not only shaped the information behavior of young people but also changed the everyday life of older generations. Schaeffer (2019) reviewed the technology advancements in the last decade in the U.S. and reported that from smartphones to social media, tech use had become the norm in the last 10 years. In 2019 nine out of ten U.S. adults went online, 81% owned a smartphone and 72% used social media. She stated, “[T]here just aren’t many non-users left, especially among younger generations.” Also, based on a survey conducted by the Pew Research Center between January 8 and February 7, 2019, Vogels (2019) reported that although “Millennials have often led older Americans in their adoption and use of technology, ... there has been significant growth in tech adoption since 2012 among older generations - particularly Gen Xers and Baby Boomers” Fifty-five percent of Gen Xers, 53% of Millennials and 52% of Boomers said they owned tablets, and 78% of Millennials, 78% of Gen Xers and 74% of Boomers subscribed to home broadband. According to the survey, use of Facebook had grown fastest among older generations since 2012: that of Millennials from 82% to 84%, Gen Xers from 67% to 74%, Boomers from 43% to 60% and the Silent Generation (born 1930-1945) from 21% to 37%. The growth rates suggest that the older generations are catching up in technology use. But does the expanding tech penetration rate represent the same use behavior of DIs and DN’s?

Prensky (2001) first coined the terms “digital natives” and “digital immigrants” and pointed out that young people grow up in a digital environment, and thus are better at using information technology than older people. Older people with their life experience across both non-digital and digital environments have to acquire new technology skills, and are likely to practice them with an “accent.” Many researchers (e.g., Gaston, 2006; Bennett, Maton, & Kervin, 2008; Palfrey & Gasser, 2011; Liu, 2014; Dimock, 2019) have used the terms coined by Prensky, but used various cutoff dates between them. Many others (e.g., Tapscott, 1998; Dede, 2005; Pew Research Center, 2007; Salajan, Schönwetter, & Cleghorn, 2010; Palfrey & Gasser, 2011; Ransdell et al., 2011) adopted the same terminology, and define those born in or after 1980 as digital natives, and those born before 1980 as digital immigrants. The information behaviors of these two generations (DN’s and DI’s) are considered different, but how they differ in information behavior and how they interact with each other is a significant issue because

DNs and DIs may live in the same family for everyday life or work in the same workplace and need to solve the same tasks. Uncovering the differences between generations in terms of information behavior may enhance understanding and improve interaction.

This paper aims to explore the information seeking behavior of these two significant groups, DNs and Dis, who currently represent the bulk of the labor force in the society and may live in the same family. What are their information needs and how do they seek information? Particularly in the context of everyday life and workplaces, so that we may understand the possibilities for information exchange and sharing.

Research Questions

In this study we intend to explore the information behavior of digital natives and digital immigrants in everyday life as well as work/study contexts, particularly their information needs, information seeking, and resource use. We also wish to understand whether there are differences between digital natives and digital immigrants in terms of their information needs and resource use. The research questions are as follows:

1. **What** are the characteristics of the information needs of DNs and DIs in everyday life and in work/study contexts?
2. **What** are the characteristics of the resources sought and used by DNs and DIs in everyday life and work/study contexts?

Literature Review

Digital Natives and Digital Immigrants

In 2007, the Pew Research Center in the United States reported an investigation on how “Generation Next,” born between 1981 and 1988, viewed their lives and futures, and the characteristics associated with their information behavior. Generation Next was later named Millennials or Gen Y (born between 1981 and 1996, a span of 16 years) and identified as first-generation digital natives, as distinct from Gen Xers (born between 1965 and 1980, also 16 years) and Baby Boomers (born between 1946 and 1964, a span of 19 years), identified as digital immigrants to highlight the characteristics of their tech adoption and use. The findings include: (1) Gen Nexters used technology to communicate with other people on the Internet, and via instant messaging or email; (2) they were willing to post personal information on social networking sites such as Facebook, MySpace and MyYearbook; (3) they embraced new technologies and understood their advantages and disadvantages; (4) compared with digital immigrants,

these digital natives were more willing to make new friends through new technology and maintain relationships with old friends. Gen Next, the digital natives, had grown up with computers, mobile phones and the Internet, so the interpersonal relationships and information in their lives were closely integrated with digital technology (Pew Research Center, 2007).

Some positive features of digital natives have been identified: (1) collaboration: highly team oriented (e.g., Connaway, Radford, Dickey, Williams, & Confer, 2008); (2) experiential learning: preference for learning and self-discovery (e.g., Connaway, Radford, Dickey, Williams, & Confer, 2008); (3) visual orientation: acting through the visual environment and visual information to improve work and learning efficiency (Connaway, Radford, Dickey, Williams, & Confer, 2008); (4) multi-task orientation: expanding the scope of attention, being able to engage in digital activities at the same time as other activities (Connaway, Radford, Dickey, Williams, & Confer, 2008); (5) result orientation: focus on specific results and achievements (Connaway, Radford, Dickey, Williams, & Confer, 2008); (6) confidence: feeling highly efficient in the information seeking process (Connaway, Radford, Dickey, Williams, & Confer, 2008). González-Teruel, Campos-Peláez, & Fortea-Cabo (2020) support these features of first generation digital natives. In their study of the information behavior of medical residents, they found that medical residents offered ideas for new information services, as most of them were “digital natives” who used social media, followed by information sharing, establishing relationships, and being good at searching for and using information.

Other research on digital natives reveals strength in using technology but a lack of skills in learning; that is, digital natives spent most of their time socializing and preferred games in simulation scenarios; digital natives were proficient in basic technology skills, but not familiar with more advanced skills, and were less likely to use technology to learn in the classroom (e.g., Lei, 2009; Smith, 2012; Temel Eginli & Isik, 2020). Salubi, Ondari-Okemwa, & Nekhwevha (2018) surveyed a total of 390 college students, mostly aged between 18 and 23, and claimed that undergraduate students accounted for no more than 6% of total users of electronic databases, with 62.3% of the respondents preferring print information resources. The findings suggest that tech adoption and use may be an innate ability for the younger generation but learning skills including accessing information for learning requires further education.

On the other hand, while digital immigrants may not be as fluent as digital natives in technological applications, digital immigrants learn how to operate technology by reading manuals rather than working through procedures intuitively as digital natives do. Jukes & Dosaj (2006) observed the characteristics of digital immigrants and reported: (1) preferring controlled release of information from limited sources; (2) preferring to handle tasks singly; (3) preferring text over pictures, sounds, and

video; (4) using linear and sequential methods to process messages; (5) preferring to work independently rather than collaborate with each other; (6) not being able to use technology intuitively. Since digital immigrants are foreign to digital language and digital culture, they easily get lost in the forest of information resources and channels and often worry that improper operation may break the machine/system, so they rely on external assistance such as operating manuals. Digital immigrants are cautious and prefer to learn through manuals, or face-to-face conversations and courses.

In sum, digital natives seem highly talented in technology tools, whereas digital immigrants are weak in using new information tools intuitively. Digital natives are creative, preferring visual, multitasking and game-oriented approaches in dealing with things, hoping to learn through teamwork and practical operation, and rapid flow of information. They have a preference for immediate acceptance of and response to information. By contrast, digital immigrants retain their own accent, handle tasks singly, require manuals for the learning process, and rely on text more than images. Digital natives have a large number of social interactions and a great deal of social capital. Digital natives are willing to disclose their personal information on social networks. They exchange opinions and obtain information through networks, and express self-worth and creativity on social platforms. However, few studies can be found on digital immigrants' social networks.

Information Behavior of Different Generations

Information behavior refers to a series of information seeking processes (e.g. Wilson, 1997; 2000) to solve information needs. After information is obtained, it can be collated and utilized (e.g. Pettigrew, Fidel, & Bruce, 2001; Chang, 2001, etc.) Different generations' information behavior could be recognized in everyday settings as well as in work and study contexts. Dabija, Bejan, & Tipi (2018) compared Millennials and Gen Xers in choosing food products and tourist services and found that Millennials were easier to target, persuade, and influence through social media, while Gen Xers were more conservative, preferring to look for additional information about products and companies based on their personal desire to become informed. Millennials placed greater reliance upon online information than Gen Xers.

Connaway et al. (2008) investigated the information behavior of faculty (Baby Boomers), postgraduates (older Millennials) and college students (Millennials), and found that college students' information seeking showed a preference for speed and convenience. Their first choice for information was Google, followed by seeking help from friends and parents, and considered the authority of electronic resources, but often made convenient choices based on cost/benefit considerations. Graduate students also believed that Google was a resource for rapid search, followed by human resources (including academic elders and friends), using the convenient communication characteristics of the Internet, and accessing library

resources in the form of electronic resources; yet their research techniques were more complex and detailed, including citation search, interlibrary cooperation and library databases. Faculty also used Google to perform quick searches to easily locate information on the Internet, but preferred the personal library, human resources such as colleagues and experts, and using databases in the library. Faculty found that the library's electronic resource collection had greater credibility and authority than non-library resources. The information search process is complex and faculty tend to continue their searches for information until a topic has been exhaustively covered. It was found that besides the differences in searching behavior, their mindset as to the levels of complexity and exhaustiveness that must be achieved before a task could be considered to have been completed was also distinct.

Information practice in everyday contexts

Savolainen (2008) argued that traditionally, information need had been studied from the individual cognitive perspective, ignoring social and cultural aspects. He thus proposed that information practice in everyday life consists of information seeking, information use and information sharing, emphasizing that the individual's life world is constructed by personal experiences and social, cultural and economic contextual factors. This model expands the study of information behavior by taking society, culture, and personal experiences into account.

Research Design

This study takes a qualitative approach by using semi-structured interviews and a V-R map (White & Corne, 2011; 2017) as a supplement to collect data. Savolainen's everyday life information practice model was applied in designing interview questions. Interview questions are outlined below.

1 In the context of everyday life

- 1.1 Based on your past experiences, would you please share a recent case of information seeking in everyday life? And please share your search history/processes.
- 1.2 Please describe what resources you selected and used.
- 1.3 Please describe how you evaluated the information resources, if you did so.
- 1.4 Please describe your information sharing experience, if you had one.

2 In the contexts of work/study

- 2.1 Based on your past experiences, would you please share a recent case of information seeking in your work/study situation? And please share your search history/processes.
- 2.2 Please describe what resources you selected and used.

2.3 Please describe how you evaluated the information resources, if you did so?

2.4 Please describe your information sharing experience, if you had one.

V-R Map, a visual web questionnaire (White, Connaway, Lanclos, Le Cornu, & Hood, 2012) developed by Oxford University and OCLC, was applied to collect and analyze the digital resources use by DIs and DNs to position their information behavior in everyday life as well as in institutional/work/study contexts. One extreme of the X-axis is the visitor (representing rare users) and the other extreme is the resident (representing heavy users). The Y-axis refers to the individual's everyday life, and the counterpart is institutional, the contexts of work and study (Figure 1).

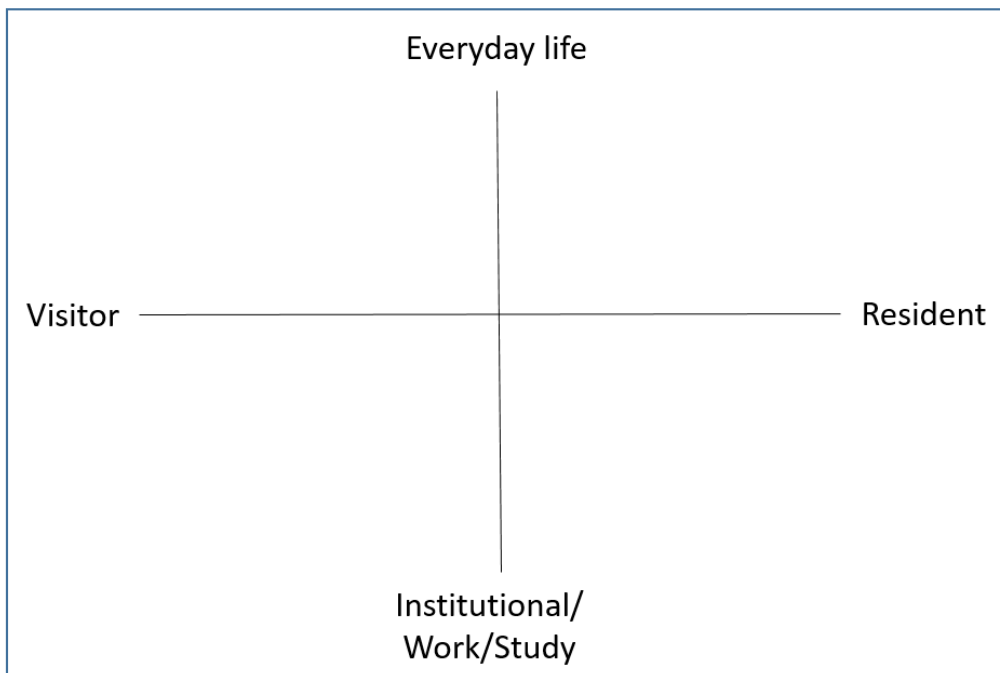


Figure 1 **V-R Map** (White, Connaway, Lanclos, Le Cornu, & Hood, 2012).

Data collection

A total of 20 respondents, comprising 10 digital natives and 10 digital immigrants, were recruited by purposive and snowball sampling. The subjects matched the definitions of digital natives and digital immigrants given by Prensky (2001), Dede (2005), Havenstein (2008), etc. That is, digital immigrants were those born before 1980, who could be Gen Xers or Baby Boomers. Semi-structured interviews were conducted between March 27 and May 27, 2017. After the interviews, the V-R map tool was used to map the interviewees' use of digital resources. Demographic descriptions of the respondents are given in Table 1.

Table 1 Descriptions of Respondents.

No.	Gender	Year of birth	Age	Education	Occupation	Media devices owned
DN01	F	1990	27	Master student	Graduate student (LIS)	Notebook, mobile phone
DN02	F	1989	28	Master's degree	Librarian	Computer, notebook, mobile phone
DN03	M	1992	25	College student	Student (Engineering)	Computer, mobile phone
DN04	F	1997	20	College student	Student (Physics)	Computer, mobile phone, tablet
DN05	M	1995	22	College student	Student (Public Relations)	Notebook, mobile phone
DN06	M	1984	33	Master's degree	K-12 teacher (Biology)	Notebook, mobile phone
DN07	F	1983	34	Bachelor's degree	Software engineer	Computer, notebook, mobile phone
DN08	M	1993	24	College student	Student (East Asian Studies)	Notebook, mobile phone
DN09	M	1997	20	College student	Student (Geography)	Notebook, mobile phone
DN10	F	1993	24	Master student	Student (LIS)	Notebook, mobile phone
DI01	F	1973	44	Master's degree	School administrative assistant	Computer, mobile phone, tablet
DI02	F	1967	50	College student	Freelancer	Notebook, mobile phone
DI03	F	1967	50	High-school diploma	Accounting administrative assistant	Computer, mobile phone
DI04	F	1963	54	Vocational school degree	Homemaker	Computer, mobile phone
DI05	F	1961	56	Vocational school degree	Babysitter	Mobile phone, tablet
DI06	M	1958	59	Bachelor's degree	Public service (postal)	Computer, mobile phone
DI07	M	1960	57	Bachelor's degree	Land administration agent	Computer, mobile phone
DI08	M	1956	63	Master's degree	Self-employed	Computer, mobile phone
DI09	M	1965	52	Bachelor's degree	Real estate agent	Computer, mobile phone, tablet
DI10	F	1954	65	Vocational school degree	Homemaker	Computer, mobile phone

Data Analysis

A total of 20 interview recordings were then transcribed into verbatim scripts. The letters “DN” indicate digital natives, while “DI” indicates digital immigrants. A sequential number followed to identify the respondent, for example, DN01. The line numbers of the verbatim manuscript content are

listed following the respondent's ID. For example, (DI07:52-56) refers to the digital immigrant respondent 07, and transcript line numbers 52-56.

NVivo 11 qualitative analysis software was used for open coding. The open codes were then further categorized by information needs, information seeking channels (resources), information evaluation, and information sharing and their associated contexts. For example, with *I first look for documents from Google Scholar, and then look at the titles* (DN01:86), search engine was labeled and coded and a broader category of information seeking channels in the work context was specified.

The V-R map tool was used to ask respondents to draw their resources, and a 3 x 3 nine-square grid (*jiugongge*, a technique traditionally used in Chinese cultures to map geographic distance) was added for better V-R map data coding. The positioning of respondents' information resource use was thus documented properly by the V-R map plus the nine-square grid.

Research Findings

The major findings were identified through open coding of the interview data and V-R maps, in terms of both everyday life and work/study contexts, as described below.

Information needs in everyday contexts

Knowledge, consumption, medical and leisure seemed to be the major information needs in everyday life for DIs and DN. DIs needed more traditional knowledge in history, religion, economics and politics as well as medical information, while DNs needed more state-of-the-art knowledge relating to current needs such as child rearing, children's education, current events, and leisure activities particularly.

Traditional knowledge in different subjects still seemed to be the major information needs of digital immigrants in everyday life. For example, respondent DI03 was interested in biology and the environment and liked to read *National Geographic* magazine; DI07 demanded church articles and Bible commentaries relevant to their religious beliefs; DI10 was interested in biographies of specific people; and DI08 read economic and political information just out of interest without a specific purpose.

- *As I have recently, I will pay more attention to that. Like when I was your age, I would pay more attention to FBoRLine. I am more interested in National Geographic. (DI03:73-74)*
- *I now want to study Bible information, to read the Bible. (DI07:72)*
- *Or there are some people, special people or historical figures, I know the name of this person, if I don't seem to be very familiar with them I will also go online. (DI10:188-190)*
- *I read some economic information on the Internet, but I didn't particularly search for it. It was*

about life, economics, and politics. For example, real estate information, about houses for sale and the price, etc., I will look at this.... (DI08:21-22;28-31)

Digital natives prefer knowledge on more current and practical issues, popular events and travel culture. For example, DN04 was interested in children's education and would read articles on children's education; DN04, who had participated in the Sunflower Student Movement, began to pay attention to the history of Taiwan, such as the White Terror; DN06 was interested in the geisha in the Gion district of Kyoto, Japan because of a recent trip there. It can be observed that the needs for daily life knowledge are divided into interest in specific topics based on the individual's life experiences.

- *Maybe I read some. Now that there are not many articles or news on the Internet, I would like to know something, or I would look for it when I encounter a term that I don't understand. Topics, news, and some sharing of how to teach children, how to bring up children, parents and children or whatever. (DN04:28-31)*
- *For example, the history-related are White Terror and Zheng Nanrong. Zheng Nanrong fought for freedom of speech in his time and was arrested. He didn't want to be arrested, so he died by self-immolation. I didn't know until a year ago, but I slowly realized that the process was very difficult. (DN06:66-68)*
- *Recently I went to Kyoto to see the cherry blossoms, so I just looked at Gion, Kyoto just some geishas and didn't understand some of them, so I just went online to find out. (DN07:66-67)*

Yet some information is difficult to obtain from common channels such as the Internet and the media. One needs to contact relevant agencies to obtain first-hand information, such as the special experience of DN08.

- *Because I recently helped to set up an exhibition, he was actually, and he was looking for someone related. The theme was about the phenomenon of live organ harvesting in China, because I previously worked as a volunteer with the Taiwan Organ Transplant Care Association, and at that time I paid attention to some medical conditions in Taiwan. Then a lawyer investigated a notorious incident in China in which the government secretly harvested organs from prisoners or from executed prisoners. (DN08:61-64)*

Health information is a big need. If a person or their family members feel unwell, they will need health information. Seeking health information on the Internet is very common.

- *Like Knowledge+ [tw.answers.yahoo.com] on the Internet, such as what problems you have encountered, for example, how to treat a sore throat, and similar things will I will go to this site. (DI06:30-31)*

- *When my family members have medical needs because they are going to have an examination, but examinations are all specialist terms, such as brain wave ultrasound, etc., they will want to know how this device was used. The family will want to know whether he is lying alone or otherwise, because it will involve the time spent and the cooperation we have to do. In some inspections, he cannot have metal on his body. This information is what the family will want to know. ...Dad and Mom, it is impossible for him to check on his own when my dad is sick, and he has no idea in this respect, and even if my mom does the check, he will be afraid of not knowing whether she checked it right or not. (DN01:88-93)*

Both digital natives and digital immigrants have shopping needs and behaviors, such as online shopping, ticket purchases, and restaurant reservations.

- *For example, yesterday I was looking for, -- because I wanted to buy kimchi, pickles and then I will go to add a recommendation, then pick out a few look like this, because this process is very habitual, may again find travel message. (DI01:32-33)*
- *Will take a train, we go online for ticket, buy things and find information through Internet. (DI06:24-26)*
- *Find a restaurant to have dinner with some friends. I use the search engine mainly for some specific search purpose, such as when you might want to give something or buy something. (DN10:151-52)*

When digital natives have leisure needs, are interested in certain activities (such as concerts and video games), need information to participate in leisure activities (such as gyms and softball teams), or wish to increase their self-competence, they need to find information online.

- *Look for a movie and read the film reviews. (DN10:152)*
- *Just the gym. (DN03:86)*
- *Are all video games, I play PS4 game. (DN06:52)*
- *Because I also belong to a softball team, I look for batting stance tips. (DN09:30)*

Table 2 Information Needs of DIs and DNs in Everyday Life.

DIs	DNs
<ul style="list-style-type: none"> ● Knowledge acquisition <ul style="list-style-type: none"> ■ Biology, environment, <i>National Geographic</i> magazine (DI03) ■ Religion, church articles, Bible (DI07) ■ Biography (DI10) ■ Economics and politics (DI08) ● Medical needs (DI01, DI06) ● Online shopping, DI06 <ul style="list-style-type: none"> ■ To buy kimchi, pickles (DI01) ■ Train ticket purchase (DI06) 	<ul style="list-style-type: none"> ● Knowledge acquisition: current needs mostly <ul style="list-style-type: none"> ■ Children's education (DN04) ■ Sunflower Movement (DN04) ■ Traveling information, geisha in Kyoto's Gion district (DN06) ■ Specific information, such as China live organ harvesting (DN08) ● Online shopping <ul style="list-style-type: none"> ■ To reserve a restaurant online (DN10) ● Leisure needs <ul style="list-style-type: none"> ■ Look for a movie/read film reviews. (DN10) ■ Book the gym, exercise activities (DN03; DN09) ■ Online concerts and video games (DN06)

Information needs in work/study contexts

The information needs of DNs and DIs at work/study strongly relate to the respondent's occupation or role. For example, those who work in a business or enterprise may seek information to solve problems and strengthen capabilities and related knowledge to ensure the business will proceed smoothly, while the student respondents reported they needed information for their term papers or theses.

Both DIs and DNs needed to find information to complete job tasks, to answer questions, and to strengthen job-related knowledge.

- ... one of my job tasks is to use educational courses, I need to teach readers to use it. It may be to use a database, or some software tools such as Endnote, but the supervisor wants to organize both Chinese and English resources, so he requires us to collect educational materials, the English version. (DN02:13-18)
- ... for example, our customer has some questions, and then we need to find the answer and tell him the answer he wants. (DI09:16-17)
- We also have many other departments that will ask us some process-related questions. (DN03:12-13)
- Check information about the law, because when we are doing the writing, there may actually be some changes. (DI07:35-36)
- Find academic background information about the process related to the work, because it had not been taught before, it could be said that they are accumulated by experience. ... he does not understand the real principles, old engineers are like this. They actually don't understand the

principles too much. To go further, I know which direction to look for for them. (DN03:8-10)

- *I am writing my thesis, and my thesis is to find disaster news and analyze it, so I have to structure my research method first, so I will first find a paper on disaster news. (DN10:13-14)*

Table 3 Information Needs of DIs and DNs in Work/Study Contexts.

DIs	DNs
<ul style="list-style-type: none"> ● Complete work tasks <ul style="list-style-type: none"> ■ To find information for boss ■ Looking for bidding information ■ Find solutions for difficulties at work ● Strengthen business-related knowledge <ul style="list-style-type: none"> ■ (Babysitter) Look for cooking recipes ■ Job related legal information 	<ul style="list-style-type: none"> ● Complete job tasks <ul style="list-style-type: none"> ■ Collect educational resources ■ Apply teaching materials ■ Compile international news ■ Answer questions from the R&D department ● Complete school work <ul style="list-style-type: none"> ■ Writing term papers ■ Writing thesis ● Strengthen business-related knowledge <ul style="list-style-type: none"> ■ To learn new academic fields ■ Knowledge about the manufacturing process ■ Update professional technology ■ Understand relevant information of partner units

Information resources used in everyday contexts

The information resources for DNs and DIs in everyday life are diverse and rich, including search engines, contacts, books, social networking sites, mobile apps, others' experiences, etc.

Both DNs and DIs use search engine for information seeking. Keywords and browsing strategies are used if the search target is not clear. If the search target is clear, they go to the official website to find information directly. They also use image and map functions to find specific information and geographic locations.

- *Then sometimes I will look for pictures, that is, I see what I like. After a good review, I will look for this [store].... In fact, I also look for pictures, mostly use search engines. (DI01:47-50)*
- *Use the map, use the map to search for a rough idea of what's nearby. (DN10:49-52)*

In the process of seeking information in everyday life, DNs will consult other people's opinions for travel information, gym course information and movie reviews, etc. through social networks and bloggers for guidance.

- *The first is to rely on people, and then go online to find the [gym] next to me, OK, because it also has the quality of coaches and the quality of members. (DN03:86-87)*

- *The Internet is full of famous blogs, that is, bloggers who share some of their traffic in Japan will refer to the things they have compiled, and some of the things they have compiled have official websites. Link. (DN02:72-76)*
- *If it is also an Internet check, see the sharing experience of experienced people, and then adjust your actions, mainly by Google to see what shared posts are available. (DN09:30-32)*

The digital native respondents reported borrowing and purchasing books for travel needs.

- *These different areas need to be discussed separately, attracted by some books or web pages, or talk to friends to decide which spots you want to go to. (DN02:71-72)*
- *As far as bloggers are concerned, many bloggers will share, and then the classmates also. They also bought a book, which is a travel book that they read. (DN05:43;45-46)*

DNs and DIs both use social networks to encounter information, from passively obtaining information from friends' posts and advertisements to actively seeking information by joining clubs and fan pages. Social network websites have expanded people's information behavior.

- *FB, there will be on something like an advertisement, or something like National Geographic magazine. If I am interested, I will click through it. (DI03:74-77)*
- *Is like now Facebook has some, mainly because he himself said that he is an expert educating children. (DN04:33)*
- *And when you have Facebook, you can see what your friends are doing recently. You can easily know how they are today, how they were last week, and what he/she is thinking about. Facebook lets you know what friends are doing through a platform (DN07:190-194).*

DIs are particularly active in joining specific clubs and fan pages according to their topics of interest, and continue to obtain articles shared by clubs and fan pages as well as the latest event information.

- *I directly added his clubs on FB. His clothes were picked up from it, and I would buy them if I liked them. There were also some fan pages on FB. There are also recipes shared. (DI05:87-88;93-94)*
- *On Facebook, it's very popular, and then I actually join some clubs and then fan pages, they will regularly provide information that I am interested in, such as the activities taking places, so mostly I find information from Facebook, because it is mainly casual and not like work. You may search extensively. (DN07:69-71;74-75)*

A digital immigrant respondent such as DI06 will go to Knowledge+ to search for others to share experiences, while a digital native respondent will go onto PTT to see relevant comments from netizens

because it is quite difficult to know the real situation of a gym or game playing strategies from an official website. It is easier to collect information on real use shared by experienced netizens.

- *There are many things on PTT. Anyway, the netizens will always digress after discussing them. For example, if I talked about coaches and courses, then what I have been in, then I will say which one has a bad attitude. And what kind of coach is not qualified, in short, there will be a lot of discussion threads below, and there will be a lot of information in it. (DN03:92-96)*
- *I will go to PTT to search. It has a play station version, and Bahamut also has it. There will be someone on it to help you organize it well, if you want to get started.... (DN06:52-54)*

All interviewees had mobile phones and used mobile phones to download related applications to obtain information, such as news information, traffic information, and game information. However, the mobile phone most used by digital immigrants was LINE. News and other information were fetched from LINE.

- *In the early days, when reading newspapers, there was a lot of ink and it was dirty, so I like to read newspapers on the Internet, because there are time constraints on TV, for example, maybe the whole point of news, I may be, I will download certain newspapers, when you want to see, you can click in at any time. (DI04:54-56)*
- *Because friends have been in Japan, they recommend the app, the traffic app can be checked. (DN02:76-77)*
- *If there is a popular online game, there will be other apps to tell you timely new information. (DN06:56)*

Information resources used in work/study contexts

The information resources used at work/school by digital natives and digital immigrants depend heavily on search engines. Digital immigrants will ask the relevant personnel to obtain information, while digital natives also use books and other online resources

Digital immigrants who have a clear goal will search directly and enter the target website. And they will browse and explore the search results when they do not have clear targets. They will also ask colleagues, manufacturers or contractors. The digital natives in this study are mostly students; as such they do not just rely on search engines, but also use books and other online resources based on the context of needs.

- *I usually go to first, I'll Google first, go to Google and then look for it..., and directly enter keywords. When looking for something totally unknown, I always go to Google first. (DI01:17)*

- I may make a telephone inquiry to the relevant unit or the contractor. Sometimes because there is too much information, sometimes you can directly find the contractor of the relevant unit, and they will be more clear. (DI09:25-27)
- Because news is mainly about images, not blogs or anything, basically images first, so we will first go to the YouTube or Reuters material library to find relevant images, such as Trump's election. We will go to his election speech, mainly to find the image, and then to find the matching report. (DN08:32-35)

The V-R map analysis supports the findings that information resources are largely used for everyday life rather than work/study contexts. Figure 2 demonstrates four quadrants. The first quadrant represents heavy users in everyday life with a total of 81 occurrences. The second quadrant represents rare use in everyday life with a total of 35 occurrences. The third quadrant represents rare use in work/study contexts with a total of 23 occurrences. The fourth quadrant represents heavy users in work/study contexts with a total 34 occurrences. The analysis seems to show that most information resources are used for everyday life rather than in the context of work/study. An obvious observation is that YouTube was largely used in everyday life but not in work/study contexts (Figure 2).

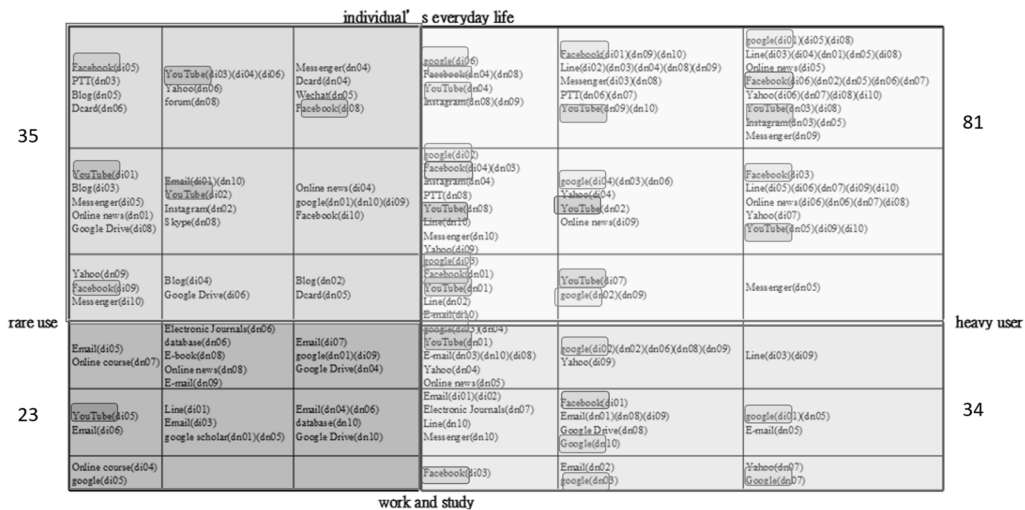


Figure 2 Analysis of Information Channels on V-R Maps

From V-R map analysis, it was found that digital immigrants mainly use a single social networking site (e.g. Facebook) and messaging software (e.g. LINE), while digital natives also use other social networking sites (e.g. Instagram) and messaging software (e.g. Messenger), and operate other netizen commenting platforms (PTT, Dcard) and forums, etc., to obtain information. The resources used by

digital immigrants are mostly to extend their interactions with their real-world social networks. In contrast, digital natives use PTT, Dcard, forums and other platforms to interact and communicate with netizens not necessarily within their social network.

A matrix further analyzed digital natives' and digital immigrants' information resources by type. It was found that there seems to be similarity between DIs and DNs in terms of search engine, social media, and instant messaging use. However, DIs seem to use varieties of other tools such as WeChat, Google Scholar, Skype, electronic journals, databases, online courses, forum, e-books, etc, that were not reported by DIs (Table 4).

Table 4 Information Resources Used by Digital Natives and Digital Immigrants

Types	Resources	DN	DN	DN	DN	DN	DN	DN	DN	DN	DN	DI	DI	DI	DI	DI	DI	DI	DI	DI
		01	02	03	04	05	06	07	08	09	10	01	02	03	04	05	06	07	08	09
Search engine	google	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	yahoo				V		V	V		V				V		V	V	V	V	V
	YouTube	V	V	V	V	V	V	V	V	V	V		V	V	V		V	V	V	V
social media	Facebook	V	V	V	V	V	V	V	V	V	V			V	V	V			V	V
	Instagram			V	V	V				V	V									
instant messaging	line	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V			V	V
	email	V	V	V	V	V	V	V	V	V	V	V	V		V	V	V	V	V	V
	messenger			V		V				V	V	V		V		V				V
others	Dcard				V	V	V													
	PTT			V			V	V	V											
	google drive		V		V					V		V				V			V	
	Blog		V			V								V	V					
	WeChat					V														
	google scholar	V				V					V									
	online news	V				V	V	V	V		V				V	V	V		V	V
	skype							V		V										
	electronic journals						V	V												
	database						V				V									
	online course								V											
	forum											V								
	eBook											V								

Table 5 Similarities in Information Behavior between DIs and DNs in Everyday and Work/Study Contexts

Information behavior	Everyday life	Work/study contexts
Information needs	Knowledge acquisition and shopping	Role/occupation related
Information seeking tools / resources used	Search engines and social networking sites	Search engines mostly

There are similar information behavior found in DIs and DNs. In everyday life, the needs for information of both DIs and DNs were mainly to gain knowledge and for shopping. In terms of information seeking behavior, both DIs and DNs used search engines and social networking sites to obtain information. For information evaluation, both DIs and DNs counted on authority, self-verification, size of social network, number of agrees, and content. For information sharing, the main purposes are to communicate and to maintain relationships. In the contexts of work and study, both DIs' and DNs' information needs are mostly job related. And their information seeking tools remain the same, as search engines (Table 5).

Table 6 Differences in Information Behavior between DIs and DNs in Everyday and Work/Study Contexts

Information Behavior	Everyday life	Work/study contexts
Information needs	DNs look for recreation, leisure information online heavily DIs Mainly for knowledge acquisition and shopping	
Information seeking tools/ resources used	DNs seek personal opinions and information from online peers. DIs depend more on physical-world relationship	DNs used more information resources such as digital books and online databases.

Differences were identified between DIs and DNs in everyday context information behavior. In terms of information needs, DNs looked for recreation and leisure information online heavily while DIs were mainly oriented toward knowledge acquisition and shopping. DNs also sought personal opinions and verified quality information from their online peers. DIs tended to seek personal opinions and verify quality information from their physical-world interpersonal relationships. In the work and study contexts, DNs used more information resources such as digital books and online databases to seek information while DIs consulted their associates in the physical world (Table 6).

Conclusions and Implications

This study finds that information needs for both digital natives and digital immigrants include knowledge and consumption related information, and for digital natives in particular, leisure. The major information seeking tools are search engines, mobile applications and social networking sites, while digital natives depend also on other online users' opinions of their first-hand experiences. In the work/study context, the information needs of digital natives and digital immigrants are mostly job-related and role-dependent. Both groups use keyword searching, while digital immigrants consult real-world interpersonal networks, and digital natives consult books and other online resources including their online associates.

These findings basically echo the previous literature that DIs although adopting tech use, remain more reliant on real-world interpersonal relationship unlike their counterpart, the DNs, who place more trust in netizens in the virtual world, the Internet. It seems that the accent of DIs do not make much change although the adoption of the tech use increased.

Some significant discussions are elaborated below.

1. Perceptions of the real world differ between DIs and DNs.

Although tech adoption and use has increased among DIs reported by 2007 Pew Research Report, the information behavior explored in the present study does not show very much change. That is, DIs still rely more on interpersonal relationships in the physical world than on the net while DNs make interpersonal relationships on the net and trust peers online even if they do not know each other in the physical world.

2. Information needs in everyday life differ between DIs and DNs, which may create gaps for sharing information in the family.

The study found that DIs are interested in traditional subject knowledge acquisition, such as biographies or world history, while DNs are more interested in current and immediate problem solving as well as leisure information, such as on raising kids, traveling, games, etc. They do not have many information needs in common and thus there does not seem to be very much benefit to intergenerational information exchange in the family.

3. DNs consult printed books not only for study but also in the everyday context, particularly for travel information.

The study found that DNs consult printed books not only for study but also in the everyday context, particularly for travel information. Actually, the results may due to the sampling bias that 7 out of 10 DN samplings are students. But using printed books for not study purposes for DNs is also an interesting phenomenon deserving further attention. Another concern is that there are more and more ebooks available online. But the growth of the genre of quality information resources available online seems to be outside users' knowledge. Thus, digital literacy education is highly recommended and expected in the digital society.

4. Both DIs and DNs are found to use search engines for seeking information, without mentioning other electronic databases nor other knowledge intensive digital libraries.

This finding is similar to Salubi, Ondari-Okemwa, & Nekhwevha (2018) who surveyed 390 college students and found that only 6% of the respondents used electronic databases. This suggests that although tech adoption and use have increased in the digital society, learning to learn and learning to access quality

learning resources are needs for future information literacy education in schools as well as lifelong learning programs.

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探索數位原住民和數位移民的資訊搜尋行為

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關鍵字：數位原住民；數位移民；資訊搜尋行為；資訊需求

【摘要】

數位原住民和數位移民生活在同一個環境中。他們可能是同事、夥伴和家人。探索他們的資訊行為不僅可以增進彼此的了解，還可以增進同事、工作主管、學生，以及教師等代間的彼此理解。本研究旨在了解數位原住民和數位移民在工作場所和日常生活的資訊搜尋行為，藉由目的和滾雪球取樣方法，招募共 20 位受訪者（數位原住民和數位移民各 10 名），研究採半結構訪談和 V-R 地圖工具收集資料，轉錄訪談語料並進行質性分析。研究結果發現，在資訊需求方面，數位原住民（DN）和數位移民（DI）在日常生活中有不同的資訊需求，但是在工作／學習環境中的資訊需求，主要是視角色而定；在資訊使用方面，不論在工作／學習環境和日常生活中，數位移民似乎較數位原住民更依賴於物理人際網絡；在資訊搜尋方面數位原住民和數位移民都嚴重依賴搜尋引擎和社交網絡，忽略圖書館所提供的許多高品質且有組織完善的數位資源，顯示圖書館和各級學校教育，需加強在各級學校和終身教育制度中，提供資訊素養教育計劃。