

A Framework to Capture the Cultural Characteristics of Digital Natives

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Abstract—Advances in computer and communication technology have brought about a so-called digital exodus and have impacts on the whole social life. The most remarkable example of the changes brought about by these advances is the birth of an entire generation of digital kids. These emerging “digital natives” are providing the impetus for profound social changes and cultural conflicts. The author presents the reasons why the significance of cultural clashes with digital natives is underestimated. From an interaction-based method, the author identifies five interaction patterns of digital natives from different applications. Next, the author discusses a three-layer view model of digital native culture from the viewpoint of the five interaction patterns. Then, the author discusses the emotion and value systems in these patterns. The proposed approach provides a stepping stone to identifying the structure of the culture of digital natives and toward understanding the cultural conflicts surrounding digital natives.

Keywords— Digital native; Digital immigrant; virtual world; social service; cultural conflict;

I. INTRODUCTION

Advances of computer and communication technology brings so-called digital exodus and impacts the whole part of social lives. The most remarkable example of the changes brought about by these advances is the birth of an entire generation of digital kids. Today’s affluent information environment does not only impact the tools that available, but also influences the fundamental culture of kids.

Kids develop a mental attitude toward the world by the age of seven. In the past, this period of years was the time span during which kids learned how to deal with their family and local community. This landscape is radically changing with the emergence of the pervasive Internet.

In the 1980’s, research that focused on computer-supported cooperative work (CSCW) started to deal with technology-augmented collaboration and came to acknowledge the cultural influence of technology

use. Social contexts are influenced by social norms, expectations, and mindsets, which are the so-called “software” of the mind. Culture works as a tacit framework for social behavior.

There are many reasons that cultural conflicts are difficult to identify and analyze. The cultural conflicts with digital natives are no exception.

Cultural conflicts are both realized on a planetary-scale and on a micro-home-scale. So, they are difficult to identify and deal with. Adopting a grand view as a methodology for identifying the characteristics of the culture of digital natives and cultural conflicts with existing cultures is necessary, and is a challenging research topic.

The author proposes a framework that identifies the different characteristics of the cultural interactions of digital natives.

II. BACKGROUND

A. Purpose of Research

The aim of this research is to identify a research framework that is able to deal with the cultural conflicts that arise with digital natives.

A. Related Work

In 2001, Marc Prensky coined the phrase “digital natives” to refer to the new generation of students who have grown up surrounded by technology [1]. During the ’00s, there was a discussion about the new wave of digital natives [2].

Research that focuses on digital natives consists of four domains:

(a) characteristics of digital natives, (b) social aspects, such as attitudes, (c) regional studies on digital natives, and (d) application-domain studies, such as e-learning.

TABLE I
DEFINITIONS

Term	Definition
Culture	A software of mind shared by a group of people, in terms of norms, values, interaction styles, symbols, and so on.
Technology-augmented culture	Culture shaped through the extensive use of technology in communication, collaboration, and social interactions.
Digital natives	People who have been using digital technology since their infancy.
Digital immigrants	People who came to use digital technology in stages after they became adults.
Digital native culture	Culture shared by digital natives.
Cultural conflicts	Social conflicts that occur among people from different cultures due to cultural differences.

TABLE II
RESEARCH QUESTIONS ABOUT CULTURAL CLASHES WITH DIGITAL NATIVES.

Domain	Question
Definition	What is the definition of a digital native? What is the definition of a cultural clash with digital natives?
Identification methodology	What is the methodology for identifying cultural clashes with digital natives?
Categorization methodology	How many patterns are there of cultural clashes with digital natives?
Phased analysis methodology	What are phases of a cultural clash with digital natives?
Harmonization systems	What systems (mechanisms, services, education systems) are there for harmonizing digital native culture and non-digital native cultures?
Prevention methodology	What is the methodology for preventing cultural clashes with digital natives?
Cultural spectrum	What cultures have a high possibility of cultural clashes with digital natives? What cultures have a low possibility of cultural clashes with digital natives?

In the first domain, the characteristics of digital natives are as follows: Davies et al. discussed the lack of digital wisdom in the young generation [3]. Jones et al. discussed the risks of capturing a new generation from the university survey as a single digital generation [4]. Teo proposed the Digital Natives Assessment Scale (DNAS) in order to provide a measure for digital native research [5].

In the second domain, the social aspects of digital natives are as follows. Vodanovich et al. discussed the differences in attitudes toward information systems between digital immigrants and digital natives [6].

Varela-Candamio et al. discussed social networks and Internet reliability in relation to digital natives [7]. Mäntymäki et al. discussed the social virtual

world using a multi-method approach [8]. Yamakami discussed the cultural dimension of the virtual world [9].

In third domain, the regional aspects of digital natives are as follows: Thinyane discussed the digital natives in South Africa [10]. Uğraş, et al. discussed the multi-tasking nature of digital natives [11]. Ramdhani et al. discussed that there were no differences in ICT-related factors in multiple age groups in Indonesia [12].

In the fourth domain, the application-specific aspects are as follows. Thompson presented an empirical study of positive and negative correlations in the survey of digital natives as learners [13]. Ng presented that digital literacy can be taught to digital natives [14]. Margaryan et al. discussed the misleading nature of digital learning for digital natives [15]. Kolikant discussed the digital natives' self assessments of their learning capabilities [16].

The originality of this paper lies in its identification of a research framework that deals with the cultural conflicts that arise with digital kids.

III. RESEARCH CONTEXTS

A. Definitions

This paper deals with cultural conflicts between digital natives and digital immigrants. 'Digital natives' and 'digital immigrants' refer to groups of people who have adopted of digital technology at different life stages. . Definitions are listed in Table I.

B. Research Questions

Digital technology continues to penetrate everyday life. This penetration has a wide spectrum of impacts on social life. The social impacts of digital technology started capturing the attention of researchers in the early 21st century. The research on these impacts is still in its infancy. There are many research questions to consider, as depicted in Table II.

C. Method

The author takes the following steps:

- Identifying the two digital divides,
- Identifying the segments that cause digital divides,
- Identifying the structure of cultural clashes with digital natives,

TABLE III
TWO TYPES OF DIGITAL-DIVIDES

Type	Description
Digital-friendly generations and digital-unfriendly generations	As digital technology advances, communication and other social infrastructures are merged into digital ones. Therefore, digital-unfriendly citizens, such as senior citizens, encounter serious difficulties accessing basic social infrastructure services.
Digital-non-native and digital native	Digital natives create new digital native cultures. The conflicts with non-digital native cultures are difficult to capture and harmonize due to their fundamental lack of a digital native culture.

TABLE IV
REASONS FOR UNDERESTIMATION OF DIGITAL NATIVE CULTURE CLASH

Item	Description
Ignorance of cultural clashes with digital natives	Cultural clashes in the virtual world are a new phenomenon and they are difficult to imagine. I
Indistinguishability of youth and digital native culture	Infancy has many aspects of partiality, conflicts, and incompleteness. It is difficult to distinguish these common transitional aspects with emerging new cultural conflicts.
Corrective attitude toward young generation	The primary attitude toward children is corrective, therefore, it is difficult to facilitate mutual understanding.
Overestimation of controllability of junior generation	Parents are the primary participants of cultural conflicts. They have authority to control children. They have difficulty imagining that cultural conflicts are something they cannot control.
Assumed homogeneity	Many early-adaptors of technology have homogeneous mindsets originating in early adaptors. This tendency makes it difficult for them to face cultural conflicts in the future.
Underestimation of the new Internet phase of social interaction	The Internet infrastructure shifted from one of data exchange to one of social interaction. This has caused fundamental changes in the influence of the Internet. The impact from this on digital natives is still unknown and underestimated.
Micro-scale conflicts	Cultural conflicts occur in regions or contexts of confrontation with digital immigrants. Conflicts with digital natives mostly occur at home in a massively decentralized manner.

IV. OBSERVATION

A. Two Digital Divides

We are witnessing an emerging digital age, where digital technology pervades into everyday life worldwide. Digital technology is defined as technology using digital information. Once information is digitized, it can be stored, copied, and transferred in an easy manner.

This trend has brought about two digital divides, as depicted in Table III.

Throughout the advancement of information and communication technology, the former digital divide was frequently discussed. However, the latter digital divide is less acknowledged due to the difficulties and complexities of understanding cultures.

This result in the three segments of a digital society as depicted in Fig. 1.



Fig. 1. Three segments of a digital society

The digital divide between digital natives and digital immigrants has been leveraged by the ongoing transition of the second phase of the Internet as an infrastructure, as depicted in Fig. 2.

B. Conflicts created by Digital Native Culture

Digital native culture's clash with Digital non-native culture is one of the most underestimated crises in today's world. The reasons for this underestimation are depicted in Table IV.

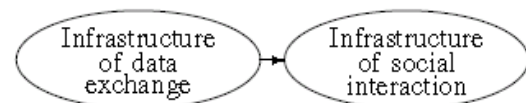


Fig. 2. Phase transition of the Internet as an infrastructure.

It is likely that we will witness the rise of more digital native cultures, which will increase the clashes between digital native culture and existing cultures. The driving forces that create clashes with digital natives are depicted in Table V. As technology penetrates into everyday life, the driving forces for the cultural clashes become more complicated.

Each generation feel differently the virtual world. The generation-specific feelings in relation to the virtual world are depicted in Table VI.

The encounters between people with different exposure to digital technology require an exploratory methodology in order to deal with cultural conflicts.

TABLE V
DRIVING FORCES THAT BRING CLASHES WITH DIGITAL NATIVES

Force	Description
Increased technology-augmented communication	Communication heavily depends on digital technology.
Increased technology-augmented community	Identity and belongings are managed increasingly with technology. Increased number of friends with whom it is only possible to communicate by digital technology.
Virtualization of home and local community	Many life-sustaining aspects are detached from home and the local community. Increased technology-empowered communication makes local community life more relative than before.

TABLE VI
GENERATION-SPECIFIC FEELINGS IN RELATION TO THE VIRTUAL WORLD

Generation	Specific-feelings
Digital handicapped	Remote, empathy-disabled and unreal.
Digital immigrant	A world beyond tools, partially artificial.
Digital native	Authentic, central to social life, tightly coupled with identity from birth.

TABLE VII
FIVE SOURCES OF DIGITAL TECHNOLOGY-EMPOWERED SOCIAL INTERACTION.

Source	Description
Information sharing	Seeking information sources on the Internet rather than from home, local communities, or physical sources.
Interpersonal communication	Using digital technology for interpersonal communication such as chats and speech communication.
Community participation	Joining virtual-world communities rather than local and physical communities.
Experience with streaming services	Experiencing virtual-world streaming experience rather than home and physical experience.
Collaboration	Participating in virtual world collaboration rather than collaboration at home and in the local community.

The author adopts an interaction-based method that identifies the cultural characteristics with focus on the interaction patterns of digital natives. The author analyzes five major types of interaction that digital natives engage within the virtual world. The five interaction types that digital natives engage in are depicted in Table VII.

These five components are representative interactions that bring cultural context to digital natives.

The author identifies five basic interaction identities that form experience patterns. The five identities and base experiences are depicted in Table VIII.

These different interaction patterns will lead to different cultural patterns since different interaction patterns bring pattern-specific emotion and value systems.

Digital technology-augmented interaction has common characteristics that are non-time-bound and non-space-bound, and that act as an open-ended and technology-augmented locus of control. Considering these common characteristics as forming an underlying common layer, the author proposes a three-layered view of culture of digital natives with a common layer as the bottom layer, an interaction-specific layer as the middle layer, and a community-specific layer as the top layer.

Communities are built on top of each application. Increasing numbers of game communities and streaming communities are empowered with bidirectional communication with increased Web 2.0 capabilities.

A layered view model of the cultural components of digital natives is depicted in Fig. 3.

Cultural conflicts are rooted in emotions and value systems. The characteristics of the emotions and value systems of the five interaction patterns are depicted in Table IX.

These emotions and value systems form the underlying factors that influence cultural conflicts with digital immigrants.

V. DISCUSSION

A. Advantages of the Proposed Method

Most of the research questions identified above are still to be pursued.

The proposed method shows a path for research from the perspective of an interaction-based method, not a characteristic-based method, which is difficult to deploy.

In order to identify digital-native-specific culture, the author proposes a methodology that focuses on interaction patterns in the different applications that are used by digital natives.

There are five different interaction patterns in which digital natives are engaged. These patterns provide different types of emotions and value systems. These characteristics lead to a reference

TABLE VIII
FIVE BASE EXPERIENCE PATTERNS OF DIGITAL NATIVES.

Interaction identity	Description
Web surfer	Unlimited and open-ended web surfing is a base experience that can lead to cultural conflicts.
SNS citizen	Endless SNS effort in the virtual world is a base experience that can lead to cultural conflicts.
Gamer	Timeless game efforts in the virtual world is a base experience that can lead to cultural conflicts.
Streaming audience	Experience of unlimited and open-ended streaming views is a base experience that can lead to cultural conflicts.
Virtual entrepreneur	Experience of incubation in the virtual world social systems is a base experience that can lead to cultural conflicts.

Sub-culture community	SNS community	Gamer community	Streaming community	Other communities (e.g. business)
Surfer	SNS citizen	Gamer	Streaming audience	Other (e.g. Virtual entrepreneur)
Common Virtual-world-origin culture				

Fig. 3. A layered view model of the cultural components of digital natives.

TABLE IX
CHARACTERISTICS OF EMOTIONS AND VALUE SYSTEMS OF FIVE INTERACTION PATTERNS

Source	Emotion	Value systems
Web surfer	Surprise, exotic feeling, curiosity	Time-less effort, openness, cosmopolitanism, erudition, early adapters
SNS citizen	Real-time excitement, diffusion of excitement, being acknowledged	Trust, resonance, closeness without physical space restrictions.
Gamer	Excitement, goal achievement, less hunger for real-world rewards	High achievement, timeless effort that is isolated from the natural time rhythm, concentration, and aesthetic senses of game world views.
Streaming audience	Excitement, sharing without time and space limitations.	Flow experience, senses that are isolated from natural time rhythm, a sense of honor based on the view counts
Virtual entrepreneurs	Openness, unboundedness	Global achievement

point for observing cultural clashes with digital immigrants.

The proposed three-layered view model further extends this perspective to provide a stepping stone that leads to construct a systematic methodology that captures cultural identity and cultural clashes with their origins in digital natives.

The proposed method provides a framework that identifies the characteristics of the culture of digital natives.

B. Limitations

This research is descriptive and qualitative.

Research hypotheses and quantitative verification of each assumption remain for future studies.

Quantitative verification of the proposed framework is beyond the scope of this paper.

Regional analysis of digital natives is not covered in this paper.

Quantitative analysis of the transitions of digital natives and the micro-segments of digital natives are beyond the scope of this paper.

Length of time spanned by cultural conflicts with digital natives is not studied in this paper. The resolution of cultural conflicts is not explored in this paper. Robust social systems against cultural conflicts with digital natives are beyond the scope of this paper.

VI. CONCLUSION

Society is becoming increasingly more digital-technology-empowered. The impacts on social systems from this technology trend are still to be explored. Cultural conflicts with digital natives are one of the challenges that are caused by those impacts.

Human beings will have to face the cultural conflicts with digital natives. The time span of these conflicts is still unknown, but it can be estimated to be more than a decade, or even more than a century.

The author discusses the reasons why these conflicts are underestimated. Next, the author discusses the structure of the culture of digital natives using the viewpoint of interaction patterns. Then, the author discusses the five interaction patterns that form cultures of digital natives. From this analysis, the author provides a three-layer view of digital native culture.

Then, the author discusses the emotion and value systems based on these subcomponents.

This paper does not cover identifying research hypotheses and quantitative verification of those hypotheses. It is challenging to pick out quantifiable digital natives for such quantitative verification.

This paper is a stepping stone for future quantitative verification.

The exodus to digital natives may be the most fundamental change in human history on a thousand-year scale. Research will be challenged to identify the fundamental social system components of human beings for hundreds of years. This research domain is still in its infancy and has to address a long list of research questions.

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