Cultural Influences and Globally Distributed Information Systems Development: Experiences from Chinese IT Professionals

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ABSTRACT
Global information systems development has become increasingly prevalent and is facing a variety of challenges, including the challenge of cross-cultural management. However, research on exactly how cross-cultural factors affect global information systems development work is limited, especially with respect to distributed collaborative work between the U.S. and China. This paper draws on the interviews of Chinese IT professionals and discusses three emergent themes relevant to cross-cultural challenges: the complexity of language issues, culture and communication styles and work behaviors, and cultural understandings at different levels. Implications drawn from our findings will provide actionable knowledge to organizational management entities.

Categories and Subject Descriptors
D.2.9 [**Software Engineering**]: Management; K.4.3 [**Computing Milieux**]: Organizational Impacts; K.6.1 [**Computing Milieux**]: Project and People Management

General Terms
Management, Human Factors, Theory

Keywords
Global Information Systems Development, Cross-cultural Communication, Cross-cultural Management, Global Virtual Teams, Offshore Outsourcing

1. INTRODUCTION
The practices of information technology (IT) offshore outsourcing and global information systems development have continuously grown to become a significant global phenomenon [7][60]. Global information systems development refers to software and information systems development work that involves collaboration between two or more organizations, or between one organization and its subsidiaries, which occurs across national boundaries. To make sense of the dynamics and complexity of global information systems development, researchers and practitioners have approached and investigated the phenomena from multiple perspectives and across different levels of analysis [1][7][12][38][39][54][60][70][71].

Global information systems development is facing a number of challenges, among which are cultural diversity and cross-cultural management. Cultural diversity is inherent in global information systems development work, given that the team members on globally distributed virtual teams have diverse national, organizational, and professional cultural backgrounds [33][59]. Cultural diversity also has both positive and negative effects on global information systems development work, which puts forward special challenges of managing the increasingly diversified global IT work and global IT workforce [29]. Studies have shown that cultural diversity may be beneficial for promoting creativity and innovation, which are important for knowledge intensive work [10][50]. However, to bring the divergent perspectives into a convergent development practice, cultural diversity can become a barrier to communication, knowledge sharing and transference [5][23][55]. Therefore, the effective management of cultural diversity is critical for organizations to succeed in global information systems development practices [36].

There is a body of literature which acknowledges the relevance of cross-cultural impacts on global information systems development. However, there seems to be a paucity of research that addresses *how* cross-cultural factors affect the global information systems development work in real settings and *how* those influences intertwine with organizational management [20][60]. Motivated by the need to gain in-depth understanding of cross-cultural challenges, this paper draws on interviews with Chinese IT professionals to explore *how* cross-cultural factors affect the collaborative global IT work between the U.S. and China.

According to a global outsourcing report that ranks the world's most competitive and popular IT outsourcing destinations, China is rated number two in the current market (following India) and number one in the next decade [49]. Several other studies also point out that China has great potential to compete in the global software and IT service market in the future

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[1][11][41]. The fast development of the Chinese IT infrastructure and IT industry has attracted the attention of IS/IT scholars and practitioners [47]. *Communications of the ACM* presented a special issue in 2005 on the impact of IT on China's transformations. However, in the research area of global IT work collaborations between China and other countries such as the U.S., studies are quite limited. We believe the findings and discussion in this paper will provide some insights to this important knowledge domain.

This paper begins with a brief overview of three interrelated literature spaces, followed by a discussion of gaps in existing literature and an introduction of the research questions in this study. Then, the methodology driving the data collection and analysis procedures is described. The paper proceeds by presenting and discussing the research findings, and concludes by highlighting implications of the research.

2. THEORETICAL BACKGROUND

This research is informed by three different but interrelated research areas, cross-cultural information systems research, global virtual teams, and cross-cultural management. In this section, we provide a brief overview of some relevant points discussed in these research fields and synthesize the issues highlighted in the literature.

2.1 Cross-cultural Information Systems Research

Global information systems development can be closely attributed to the process of globalization in which the IT industry is becoming more and more globally interconnected. A number of scholars have argued that the existing local, socio-cultural context is a critical factor in mediating the globalization process in a specific context and, in turn, will have an impact on the complexity of globalization [4][53][70].

There are two major issues existing in current research on cross-cultural information systems. Myers and Tan [51] pointed out that most research on global information systems only focuses on the national level of cultural analysis. However, the cultural context is complex and multi-leveled in nature [64]. Another issue is that many cross-cultural information systems studies often treat culture as a static concept and use predefined cultural dimensions (such as dimensions developed by Hofstede [26][27]), which do not assist in providing an in-depth understanding of the complex phenomena. Therefore, several IS scholars call for better theorizing of culture and the involvement of multiple research methodologies [51][60][64][71][73][74].

Global information systems development is situated within a complex and multi-leveled socio-cultural context, which may range from national (societal), regional, organizational, or professional (functional) levels, to the team level [10][33][40][51]. Different cultural factors at different levels coexist, interact with each other, and together produce different work environments and dynamics [64]. The relative influence of culture from different levels on global information systems development work may vary depending on the specific context of the problem under investigation [29][33]. A variety of studies have shown that it should not be assumed that national culture differences are the only or dominant influential factors [14][32][37][52][53][58][73][74]. These findings support a need for theoretical approaches that go beyond national dimension cultural models, and a need for interpretative methodologies to deepen our understandings [51][64][71].

This research adopts the *situating culture* approach, which was conceptualized by Weisinger and Salipante [72] in their studies of effective cross-cultural interactions in international joint ventures, and was applied in investigating a variety of cross-cultural IT management issues in the multinational IT sector [73][74]. The situating culture approach acknowledges that "cultural understanding is locally situated, behavioral, and embedded in everyday, socially negotiated work practices" [73, p. 306]. The argument is that because of the multiple cultural influences at different levels, culture should be redefined as a locally-based phenomenon that is grounded in everyday work practices.

2.2 Cross-culture Influences and Global Virtual Teams

One of the major challenges that virtual teams may face is effective communication and coordination. Compared with face-to-face interactions, information and communication technologies (ICTs) are usually perceived as lean media that constrain rich information exchanges and flexible negotiations [35]. Particularly when distributed team members have limited or no prior collaboration history, it is difficult to achieve shared understandings and group cohesion due to the lack of support for informal interactions [8][28][35]. Furthermore, the difficulty of remote information access and sharing, late response, and non-response (silence) may affect the maintenance of awareness in virtual teams. This in turn may increase conflict and reduce trust among team members, and have negative impacts on team performance [3][8][25][61].

Global virtual teams can be viewed as teams that are globally distributed and consist of culturally diverse members [30]. The virtual work environment of global virtual teams is not independent of the local setting and context. The local context may potentially influence the participation, work behavior, and accountability of the virtual team members [61][63]. Among those studies focused on global virtual teams, there are discrepancies regarding whether or not culture is an influential factor and how cultural differences affect teamwork processes.

For example, Cramton [8] studied globally dispersed student teams across four countries and pointed out that maintaining mutual knowledge is a central problem of dispersed collaborations. One of the problems that may lead to the failure of establishing mutual knowledge is the difficulty of understanding the "silence" in communication. However, whether or not the cultural differences may contribute to such difficulty is not acknowledged in the study. Saunders, Van Slyke and Vogel [62] argued that different global virtual team members might have different time visions. Another study by Sarker and Sahay [61] on global virtual teams consisting of the U.S. and Norwegian students indicates that misunderstandings of silence may arise from dissimilar conversation styles as a result of cultural differences.

One reason for such discrepancies may be attributed to some methodological issues in global virtual team research. Martin,

Gilson and Maynard [44] pointed out that much of the current empirical research has been conducted in laboratory settings, using student teams working on short-term projects, which may not be adequately capable of addressing issues and questions related to the contextual influences of the real work settings. Also the widely used survey methods do not generally provide in-depth understanding about "how" the cultural influences matter in the work of global virtual teams.

2.3 Cross-cultural Management

Cultural training is a common practice in cross-cultural management to prepare employees for more effective interpersonal relations with individuals from other cultures [17]. Studies indicate that there are two major issues in some cross-cultural training programs: stereotypical and one-step. Goodall [19] argued that adopting a national boundary and cultural dimensional model in cross-cultural training may only provide information on certain cultural stereotypes which trainees may find contradictory in their real work experiences. Osland and Bird [56] pointed out that while the dimensional models may be useful tools in explaining certain cultural behaviors, they may be misleading or even dangerous. Foster [16] studied the cultural training for expatriates of multi-national companies and pointed out that most of those training programs focus on pre-departure training and fail to provide continuous training opportunities to individuals during the work processes. Kealey, Protheroe, MacDonald and Vulpe [34] argued that current cross-cultural training fails to address some important knowledge and skills such as analyzing and understanding the local organizational and environmental contexts. Krishna, Sahay and Walsham [36] studied cross-cultural management in several global software outsourcing cases. They pointed out that it is important to recognize the limits of cultural adaptation of expatriates, and suggested practices such as implementing a cultural liaison position to bridge the cultural differences. They also argued the importance of systematic on-the-job cross-cultural training in global software outsourcing practices.

2.4 Research Questions

Based on a review of the relevant literature, three major gaps can be identified in existing research about cross-cultural influences on global virtual teams in global information systems development work. First, the majority of existing literature focuses on the national level of cultural context and analyzes cultural influences from pre-defined dimensions. This approach may not be robust enough for studying the diverse cultural influences of the multi-level socio-cultural context of global information systems development. Second, from a methodological perspective, especially in global virtual team research, quasi-experimental studies and survey methods are prevalent. Although those studies are informative, they may not provide the in-depth understanding of *how* cross-cultural factors are relevant. Third, from the empirical perspective, research on distributed collaborative IT work between China and other countries is limited.

Therefore, a qualitative case study was conducted to explore how globally distributed information systems development work is affected by cross-cultural factors in the case of Chinese practitioners in the field.

3. RESEARCH METHODOLOGY

Data used in this paper draws upon twelve face-to-face interviews with Chinese IT professionals, which are part of a larger, and ongoing, interpretative case study[1]. All of the participants are currently working in multinational IT companies and engaging in globally distributed systems development work. Among those 12 participants, there is one regional director, one human resource manager, one delivery manager, two project managers, two team leaders responsible for different technical functions, and five members of cross-cultural virtual teams. The sampling strategy of the interviewees was convenience-based through initial organizational contact.

The interviews were conducted in the summer of 2006, at the participants' local offices in Shanghai, China, by the first author who is of Chinese nationality. Each interview lasted approximately 45 to 60 minutes.[2] The interviews were semi-structured, in order to ensure that the phenomena of interest were brought into focus, and at the same time to allow some flexibility for exploring and probing themes emerging from the interviews (the interview guide is provided in Appendix 1). The preliminary analysis of the interview data followed the interview guide and focused on identifying themes relevant to the cross-cultural challenges experienced by the participants in their work practices. At the same time, an open coding strategy was adopted to account for unanticipated themes.

We employed the established evaluative criteria of triangulation and authenticity that are used to support the believability of interpretive findings [67]. The source of information used in this study for triangulation is participatory observation. The first author is of Chinese nationality and is attending graduate school in the U.S. This nationality-based connection between the researcher and the participants being studied provided for an authentic account of interpretations. In future research, the criteria of replication will also be sought through studying multiple cases [67].

According to Walsham [69], there are four types of generalizations from interpretative case studies: the generation of theory, the development of concepts, the drawing of specific implications, and the contribution of rich insights. Through data analysis, we identify three major themes that are relevant to cross-cultural challenges experienced by the Chinese IT professionals participating in this study. In the following sections, we discuss these themes in detail, provide some rich insights by drawing upon the quotes from participants, and discuss the implications for cross-cultural IT management and learning.

4. FINDINGS AND DISCUSSIONS

Three themes are identified as major cross-cultural challenges experienced by the Chinese IT professionals participating in this

[1] This larger case study investigates global information systems development collaborations among workers in three countries: China, India, and the U.S. The data sources include interviews with Chinese, Indian and American practitioners, document analysis, and field notes of participatory observations.

[2] The interviews were conducted in English and were recorded.

study: the complexity of language issues in global virtual work, culture and communication styles and work behaviors, and cultural understandings at different levels. Our findings show that the language barrier is not a simple issue of "knowing" vs. "not knowing". Communication style and work behavior are found to be closely related to cultural influences. The empirical findings also demonstrate that it is important for IT practitioners to develop cultural understanding at different levels. In this section, we present these three themes and provide empirical insights and discussion for each theme.

4.1 The Complexity of Language Issues in Global Virtual Work

The importance of English language skills to the success of software exporting countries has been emphasized in a number of studies [1][6][15][22][41]. Heeks and Nicholson [22] included "people" as a component of the national software-related infrastructure and attributed the English language skills of the local workforce as an enabling mechanism for the success of Ireland, India and Israel in software exports. While comparing China to India with respect to the development of the national software industry, it is often pointed out that the relatively poor English language skills of the Chinese workforce is a barrier for China in competing for the global IT services market [6][41][49].

The language issue is a common theme that emerged from the interviews with Chinese IT workers and managers. Our findings show that English language capability is rather a complex issue with multiple perspectives instead of a simple issue of knowing vs. not knowing, or good vs. poor proficiency. First, there are discrepancies regarding the proficiency level of different linguistic skills, with spoken English being the most challenging one. The participants stressed that among Chinese IT professionals in general, the reading capability is better than listening comprehension and the listening comprehension capability is better than speaking. Therefore in globally distributed IT work, some communication technologies, such as email which is asynchronous and concerned with reading and writing capabilities, may be more preferred than other communication technologies, such as a teleconference which is synchronous and concerned with listening comprehension and speaking capabilities.

> *If you write an email, they will be able to understand you much better. But [in][3] live conversations over the phone, especially not seeing each other and no body language to help them, that does pose some challenges. When writing email, you can take some time to think about it if you are not sure, but when you speak, you cannot stop for 10 minutes to think about how to say it.*

However, sometimes the delay of email responses may affect the progress of the projects, especially when there is a certain degree of interdependency among tasks that need inputs from dispersed team members [24]. One example was given by one of the software developers:

> *Those virtual communications can basically satisfy most of our needs, through emails…But one problem is that email cannot solve [the] problem right away. For an example, when I am trying to solve a technical problem, I may have some questions…The customers are not right by your sides to explain it so I cannot make assumptions and continue the work without checking with them first…And then the whole schedule will be affected.*

The second perspective related to English language capabilities is that the language barrier is more pronounced in confrontational situations than in routine work. The practitioners in our study felt that it was easier to handle routine, day-by-day work. However, in situations where conflicts are involved, the proficiency of language skills, especially the listening comprehension and speaking skills, becomes a challenge. One of the managers articulated a confrontational scenario in detail:

> *When everything goes smoothly; situations are very normal; our engineers should be able to handle it. But when things get complicated, what I observe is when there is a confrontation with different opinions, everyone has their reasons to think they are the right one, that's when the language becomes a barrier…Our folks usually are not able to grasp the key points or the key arguments right away. And therefore, they are usually slow in responding because they are little bit confused. So at the end we always said that [they] always win because they are much faster in reacting and our people are still trying to figure out what is going on...*

Conflicts, especially task related conflicts, are often viewed as important learning opportunities in the software and systems development process. Conflict may result in the challenging of existing assumptions, exploration of alternative problem solutions, and fostering of innovative ideas and creativity, though they may also have detrimental effects on team performance [31][57][68]. One of the benefits of using globally distributed virtual teams in software and information systems development is to take advantage of the diverse knowledge perspectives of global team members [13][48][66]. However, during the virtual communication process, if it is difficult for some perspectives to be conveyed or understood because of language issues, the benefits of having diverse virtual teams may not be fully achieved.

4.2 Culture and Communication Styles and Work Behaviors

Culture has profound impacts on communication styles [42]. For example, some cultural groups prefer a direct communication style, where the verbal message is direct and reveals the speaker's true intentions. In comparison, some other cultural groups prefer an indirect communication style, where the verbal message is subtle and implicit, and only hints to the speaker's intentions [18][43]. Camel and Tjia [7] illustrated a case of communication style differences between Indian and Dutch software usability engineers, whereas the Dutch engineers had a direct and assertive communication style, the Indian engineers had an indirect communication style and were reluctant to say "no". However, an assertive, straightforward communication style is necessary for performing usability engineering work. In

[3] Texts within the brackets are edited by the authors to fix the syntax or clarify the ambiguity of the original quotes.

this case, during the team building and coaching sessions, special attention was provided to help develop assertiveness in the Indian usability engineers.

Our interview findings indicate that the reluctance of Chinese software developers and engineers to speak up is one major cross-cultural challenge related to communication styles and work behaviors that affect globally distributed information systems development work between the U.S. and China. Some practitioners attributed the reluctance to speak up to the characteristics of the Chinese educational system:

> *In America, they encourage students to speak up, express themselves well. But for [us], that is a major gap. So when we are dealing with the U.S. team…a lot of times, I should say some of the engineering teams are not able to express the situations well, and therefore cause some so called unnecessary impacts to your programs. Because the other side may think you are not technically capable…That is one culture difference I see that causes some challenges within the teams. [The] other side may think Asians are not as technically capable as Americans. But that is not the case. Asian Chinese are more influenced by their childhood education: teachers teach you and you don't have to speak up.*

An additional reason for the unwillingness to speak up was attributed to an introverted personality type held by many people of Chinese culture. This introverted personality style influences behavior by which opinions are held internally and conflicts are avoided through suppression of perspectives or feelings.

> *[Chinese] people are more introverted. They are more internal. All the values are inside…They are not willing to speak up as they should be. Sometimes this works against them because if you are shy and they feel like if you don't want to challenge the colleagues or managers…When they talk to colleagues in different locations, and especially if they don't know those people, if there are some obvious things that they see are wrong, they usually do not come out and say it: "Hi, I don't think it is right". They usually don't say it. If they don't say it, things will just continue. And when it gets to certain points, it starts to blow up, [and then] that will become too late.*

Several cross-cultural management studies point out that the historical influence of Confucian philosophy in China has a significant impact on the communication styles, work behaviors, and business culture in China [46][76]. The Confucian school of philosophy values achieving and maintaining harmony and balance in the social realm [45][46]. It advocates being moderate in both thoughts and actions. When such values are manifested in communication styles and work behaviors, they result in keeping thoughts internal, indirectness and high-context communication styles, as compared to the open and direct characteristics of communication styles from the U.S. (or most western) cultures [75].

As reflected in the comments of our participants, the indirectness and quiet demeanor of the Chinese team members may be perceived as lack of confidence and lack of technical capability by their American counterparts. Additionally, this situation may have further negative effects on building trust in relationships between distributed team members. On the other hand, the combination of issues in language proficiency and indirect communication style will impose more challenges on surfacing different perspectives and bring forward constructive conflicts during the virtual work processes.

4.3 The Importance of Cultural Understandings at Different Levels

It is discussed in the research background section that global information systems development work is situated within a complex and multi-level socio-cultural context. Hence, the understandings of cultural differences are also multi-level, including making sense of different cultural influences from different levels. In this study, the importance of understanding national culture, organizational culture, and professional culture were highlighted by the Chinese managers and virtual team members.

One of the project managers described an incident he encountered during the initial requirements gathering and analysis stage of a development project, in which the American team members visited China for three weeks:

> *When they were here for the face-to-face meetings [in 2004], I spent the first weekend to accompany them to visit local attractions. But the next weekend, I arranged a travel agent for them because they told me that it was not necessary because it consumed too much of my time. At that time when I internalized it, I could not stop wondering whether it was because I did not do a good job. From our [Chinese] perspective, we view spending time together as a way of building close relationships. We are happy to do that because it will bring us closer. Maybe from their perspective, they really were being considerate and not wanted to occupying too much of my time. I did not know what the real reason was. I did not know how to interpret it. I was confused.*

This incident indicates the importance of understanding the business culture of China. What the American team members failed to realize is the criticality of "Guanxi" in doing business in China. Guanxi, referring to personal relationships or networks, plays am important role in Chinese society [76]. There is a close interconnection between personal and business relationships. It is seen as important to develop personal relationships in order to achieve positive business relationships. By not viewing the importance of spending time together as a way of developing strong personal and business relationships, the American team members somehow missed a good opportunity for team building, achieving shared understandings and building a trusting relationship with their Chinese counterparts.

The study by Guindi and Kamel [21] examined the relationship between corporate culture and multicultural team conflicts. They concluded that building a shared corporate culture and transmitting that culture to different teams would help reduce multicultural team conflicts and improve team efficiency. It was pointed out by the participating managers that while the organizational culture of multi-national IT companies usually

consists of a set of core values, the understanding and adaptation of those cultural norms by local (Chinese) employees are related to their previous work experiences. Those Chinese employees who only have had work experiences in local companies may have the most difficulties to adapt to the organizational culture of multinational companies:

> *Technically, they are all experienced… [But] culture wise, you do see a difference. If they have worked for multinational companies before, they are closer to adapt [to our] culture. If they have worked for Taiwan companies before, they are probably a little distance away. If they have only worked for local companies, they are further out.*

The effect of professional culture adds another dimension to understanding different individual work behaviors. For example, one of the project managers has engaged in a systems development project for two years, working closely with a project manager, a development team leader and a testing team leader in the U.S. via email and weekly teleconferences. He described his experiences of interacting with these three virtual team members:

> *For example, the testing team leader is very focused on details and is not very process orientated…The project manager is strongly process oriented…The development team leader does not care about schedule, resource and cost. As far as you solve the problem, he is happy…In the meeting, he is more excited about technical issues, not on detailed codes. The project leader is very sensitive to the process. You have to provide him documents and version control, updating and giving him feedbacks regularly…The test team leader is very strict, and very critical, on every line of code, like "picking bones out of egg".[4] Everything needs to be perfect for him.*

It was stressed by this project manager that cross-cultural training can only help understanding of cross-cultural differences at a high level. However, it is important to understand and pay attention to nuances in practice. Through his articulation, the nuances demonstrated in this example involve understanding different work cultures of different systems development professionals. He also mentioned in the interviews that he shared his observations with his Chinese team members and asked them to be conscious of these details.

5. IMPLICATIONS FOR GLOBAL WORKFORCE EDUCATION AND CROSS-CULTURAL MANAGEMENT

The combination of the difficulty of engaging in live conversations in the virtual work environment, the indirect communication style and the reluctance of speaking up, has a great impact on the communication effectiveness of globally distributed systems development work. The over dependence on asynchronous communication technologies (such as email) due to language skill issues may cause delay in the development work processes. According to the Chinese IT professionals in this study, the indirect communication style and the reluctance to speak up of some Chinese IT professionals may often be misinterpreted by their American colleagues as lack of technical skills and confidence. This in turn may have a negative influence on building common ground and achieving team cohesion.

The reluctance of speaking up may be attributed to language skills, the influence of a traditional teacher-centered educational model, and the influence of Confucian philosophy. It may limit the equal and active participation of team members at different locations and the opportunities to explore different ideas, and hence may become a barrier of knowledge creation and sharing in global information systems development. In addition, if certain issues are not promptly acknowledged and addressed during the development processes, it may affect the timeline, the cost of the development projects or the quality of the developed products [65].

Huang and Trauth [29] argued that while cultural factors may influence global virtual teams engaged in a variety of activities in general, they are particularly important to software and information systems development work. Compared to other activities such as new product developments in manufacturing sectors, the processes of software information systems development are more complexly interdependent and iterative, the products of software and information systems development are less tangible, and knowledge perspectives involved in software and information systems development are more tacit and fast changing in nature [29][60]. The uncertainty and interdependence of the information systems development process require both formal and ad hoc informal communication, which add further challenges to global virtual teams [9]. The change of communication patterns and the lack of effective communication channels are attributed to delays in global software development projects [24].

Recognizing the importance of improving the English language skills of Chinese knowledge workers to better prepare them for participating in the global information economy, the Chinese government has implemented several national initiatives aimed at improving English language education and training programs [15][41]. However, the traditional reading-intensive based language education strategy fails to address the need for developing comprehensive language skills including conversational skills (listening comprehension and speaking). This issue may not be resolved in the short term from the educational perspective because of the supply shortage of qualified English teachers and the traditional lecture based teaching strategy [15].

Farrell and Grant [15] reported that the joint venture of Microsoft at Shanghai hired 10 native English speakers to instruct Chinese employees on language skills. This is one example of IT companies investing in language training. To overcome the language issues, particularly the speaking skill deficiency, the multinational companies in this study implement informal learning programs called "open-your-mouth" and "English corner" in addition to formal language training programs. In the "English corner" program, there is a period of designated time every week that people get together in small groups and carry on conversations using English only. Usually each group consists of a mix of people with better spoken

[4] This is a Chinese expression to describe the extreme emphasis on nitpicking and achieving perfection.

English skills as well as those people with less capability. The purpose of the "open-your-mouth" program is to encourage employees to practice spoken English by asking them give public speeches in English.

From the short-term perspective, the communication issues resulting from language capability can be addressed by adopting certain communication strategies [2]. For an example, one manager participating in this study mentioned that a communication protocol has been established in their global virtual team to avoid using slang, unusual words, and long, complicated sentences in verbal teleconferencing communications. In another case, the project manager suggested that after every teleconference, he would compose meeting minutes and distribute them to all the collocated and distant team members to confirm the understandings and avoid potential miscommunications and misinterpretations.

In addition to the efforts of improving language skills of Chinese IT professionals, it is important to implement reward and incentive programs to encourage the generation and expression of alternative ideas. It is also important to foster an organizational culture of valuing openness, diversity and innovations. In addition, special attention is needed to transmit the organizational culture to Chinese team members who have limited work experiences with American based multinational companies.

Krishna et al. [36] pointed out that systematic on-the-job cross-cultural training is a less common practice and cultural training is usually administered in one direction (software suppliers learn the culture of their clients). In one of our examples, the American team members did not recognize and understand the importance of developing "Guanxi" in doing business in China and therefore missed an opportunity for building a close working relationship with their global virtual team members. Even though the Chinese manager attempted to interpret the incident through the lens of cross-cultural differences, he still felt frustrated and offended. This example highlights the importance of mutual cultural learning of all the parties involved in global information systems development work. Our findings also indicate that the IT professionals of global virtual teams usually gain some nuanced understandings of cultural differences in the work processes and develop different strategies to achieve better cross-cultural collaborations. Therefore, there is a need to provide practitioners opportunities to reflect on and share their tacit knowledge that is learned in practice.

6. CONCLUSION

The contributions of this research are two fold: first, we provide some insight on *how* cultural factors affect the global information systems development work between China and the U.S. by identifying three cross-cultural challenges and discussing their impacts on distributed collaborative work. Second, we suggest some cross-cultural management practices that may address those challenges. By adopting the situated culture approach, we explore some implicit aspects of cross-cultural management.

The benefits of cultural diversity in global information systems development are manifested through the divergent knowledge brought into the development processes by globally distributed team members. However, to achieve such benefits and bring the divergent perspectives into a convergent development practice, several issues need to be addressed, such as improving the language skills, fostering an organizational culture of valuing diversity and generation of innovative ideas, and facilitating the understanding and adaptation of such an organizational culture. Furthermore, it is important to provide globally distributed team members opportunities for mutual cultural learning and informal cultural learning.

In future research, we will relate these findings to those interviews with Indian and American IT professionals. In this way, we will further explore the cross-cultural challenges and management issues in global information systems development. As cultural diversity issues are becoming increasingly prevalent and important in IT work practices and workplaces, the effective management of cultural diversity, along with the cultivation and integration of cultural diversity will be critical for organizations in developing innovative capabilities and in gaining competitive advantage in the long run.

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APPENDIX 1: Interview Guide

Work Backgrounds:

1. Can you give me a brief description of your job title and job responsibilities?
2. For how many years have you had cross-cultural work experiences?
3. How much of your work is conducted face-to-face and how much work is conducted virtually?
4. What countries are your collaborators in?

Critical Incidents: Think about some project currently on-going or recently completed that is cross-cultural.

1. Can you tell me a particular incident in which cross-cultural differences affected work in the virtual work environment?
2. Can you tell me a particular incident in which the cross-cultural differences affected work in the face-to-face work environment?
3. Do the cross-cultural differences affect virtual work and face-to-face work differently? How?

Cross-cultural Management:

1. Did you have any prior cross-cultural work experiences before you joined the company?
2. Have you attended any cross-cultural training programs or seminars before?
3. What did you learn from these programs that helped you to manage the cross-cultural differences encountered in your work?
4. What is your strategy for managing the cross-cultural differences?
5. What do you think organizations could do to better help the global virtual team members in cross-cultural management?