



Development of Individual Virtual Competences: Practices in Brazilian Companies

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Abstract: The transfer of knowledge can be challenged by various factors, particularly when communication between individuals heavily relies on electronic media, as is the case during the development of virtual work. The literature suggests that the individual competence to communicate effectively in virtual settings (Individual Virtual Competence - IVC) may represent a key element of enabling this process. The mechanisms for the development of this competence, however, are not yet fully comprehended nor delimited. The objective of this study is to investigate formal and informal practices that organizations may adopt to develop IVC in their workforces. It also aims at investigating the dissemination of such practices in companies located in Brazil. To this end, the case study methodological approach was selected. The results suggest that organizations already possess the physical infrastructure and practices needed to support the development of the technical aspects of IVC; however, more effort is still needed with regard to the implementation of practices associated with the development of the non-technical aspects of IVC.

Keywords: Knowledge transfer; Virtual work; Individual competence

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INTRODUCTION

One of the most important aspects of collaborative work is the possibility of knowledge transfer from one set of individuals to another ^[1]. The knowledge transfer process occurs when a particular individual is affected by the experiences of another individual through the movement of a knowledge reservoir from the sender to the receiver, and this transfer is manifested through changes in the understanding of the recipient ^[2].

The intensification of international alliances between organizations and the development of Information and Communication Technologies (ICT) have led to an increasing number of professionals who work in virtual settings in which geographically dispersed individuals rely on electronic media to communicate and collaborate ^[3]. Therefore, the knowledge transfer process increasingly occurs between individuals who are not co-located and need to rely on technology for its establishment ^[2]. In such a new context, the already frequently complex and laborious knowledge transfer process becomes even more challenging, given the communication barriers faced by the geographically dispersed individuals ^{[2] [4] [5] [6]}.

This challenge can be approached from the perspective of the individual knowledge, skills and attitudes (KSAs) required for the establishment of effective electronic communication between individuals, a pre-requisite for the knowledge transfer process in virtual settings. Wang and Haggerty ^[6] refer to this set of individual competences as Individual Virtual Competence (IVC). According to these authors, IVC contributes to the knowledge transfer process by directly affecting the effectiveness of the communication process in virtual settings. However, the mechanisms and methods of the development of IVC in individuals are not fully defined or comprehended, thus leaving opportunities for further investigation in this area.

Given the importance of IVC to the effectiveness of the knowledge transfer process in virtual settings, the aim of this study is to explore based on pertinent literature the formal and informal practices that can be leveraged by organizations to stimulate the development of IVC in their employees. It also aims to conduct an initial assessment of the dissemination of such practices in the corporative environment by mapping their utilization in two companies located in Brazil. To this end, the case study methodological approach was utilized.

The contributions expected from this study are two-fold. First, it attempts to provide a further understanding of the mechanisms to develop IVC. Second, it supports the strengthening of the knowledge transfer process in organizations that rely on any form of virtual work.

This study is divided into six sections. Section 2 presents and discusses the main concepts utilized in this study as well as its theoretical development. Section 3 presents the methodological aspects of this research. The results and final discussions are presented in sections 4 and 5, respectively. Finally, section 6 presents the main conclusions of this study.

LITERATURE REVIEW

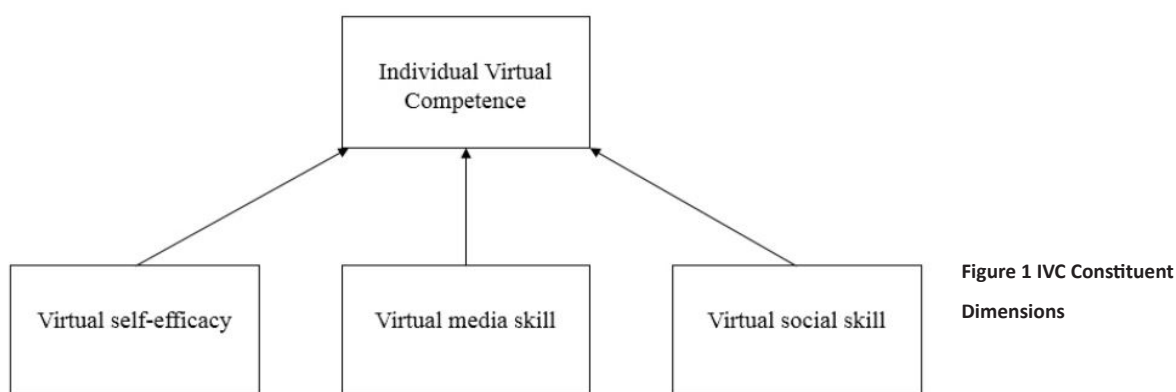
1. Competences for knowledge transfer in virtual settings

Similarly to the communication process, the knowledge transfer process, from a cognitive perspective, requires the coding, transmission, and decoding of knowledge artifacts ^[7]. In reality, the knowledge transfer process can be seen as a particular and specialized communication process ^[5] in which knowledge is transferred between parties and absorbed as changes in the

recipient's abilities ^[2]^[7]. This is frequently a complex and laborious process that requires time for its proper establishment ^[4]^[5].

As the globalization of companies and organizations is intensified, the knowledge transfer process increasingly occurs between individuals who do not necessarily share the same physical location and can be separated by geographic distances ^[2]. In this case, at one end, the sender must codify the knowledge into a certain type of knowledge artifact and transmit the artifact by using some sort of technology to the other end, where the recipient will decode the artifact received ^[6]^[9]. This transmission can sometimes not occur properly because of communication barriers associated with elements such as the limited richness (visual and verbal cues) of the information transmitted electronically or the cultural diversity of the individuals involved ^[2]^[6]. Considering these difficulties, it is reasonable to expect the knowledge transfer process to be even more challenging in virtual settings.

One possible solution for this challenge can reside in the improvement of the communication process in virtual settings, which can be approached either from the perspective of the technology being used or from the perspective of the individuals involved. According to Wang and Haggerty ^[6], virtual work is a recent phenomenon, and individuals are often still inexperienced and ineffective in communicating in virtual settings, especially when the objective is the transfer of knowledge. Therefore, these authors define Individual Virtual Competence as the extent of knowledge, skills and abilities an individual possesses to work and communicate in virtual settings for the purposes of completing collaborative virtual work. The meaning behind this definition is that individuals with higher IVC should execute activities in virtual settings, such as the transfer of knowledge, with increased performance in comparison with individuals with lower IVC. The three dimensions of IVC are: virtual self-efficacy, virtual media skill and virtual social skill (Figure 1).



The first dimension, virtual self-efficacy, refers to the individual's own confidence in his/her abilities to use computer technologies and to work with others in virtual settings. Individuals with higher virtual self-efficacy tend to look for multiple options and persist until effective communication is established using technology. In addition, virtual self-efficacy also motivates individuals to dedicate efforts to non-technical matters, such as developing the confidence to address work execution without face-to-face interaction between the parties involved. Once they have confidence to handle both technical and non-technical aspects of virtual work, these

individuals develop more effective communication and therefore contribute to the improvement of the knowledge transfer process ^[6].

The second dimension of IVC is virtual media skill. This skill is defined as the individual's capacity to utilize communication technologies and to fully explore their potential to facilitate communication. This skill therefore goes beyond the simple use of ICT and is more related to the understanding of its potential to facilitate collaborative activities in virtual settings. This is a key element to complement the limited richness of the information transmitted without face-to-face interaction, thus facilitating the knowledge transfer process between the parties.

The third dimension of IVC is virtual social skill, which is defined as the ability to build relationships with other individuals in virtual settings. Given the limited opportunities for social interaction proportioned by ICT, virtual social skill represents an important element to increase cohesiveness and shared understanding among individuals, which, in turn, facilitates communication and the transfer of knowledge in virtual settings.

In summary, Wang and Haggerty ^[6] suggest that IVC influences the knowledge transfer process in virtual settings through its impact on communication effectiveness. In other words, IVC improvement facilitates the knowledge transfer process because the three dimensions of IVC provide the foundation upon which effective communication and knowledge transfer are built.

2. IVC development

According to Wang and Haggerty ^[6], the three IVC dimensions can be developed over time. Because virtual work is relatively a new phenomenon, people are still becoming accustomed to it, and IVC can be seen as a competence to be acquired. These authors also mention that a key element of developing the three IVC dimensions is the learning acquired through the individual's cumulative experiences in virtual settings, although the specific mechanisms that enable the accumulation of these experiences are not yet fully comprehended. Furthermore, the simple accumulation of experiences throughout this time does not seem to be a sufficient condition for the development of certain abilities because these experiences may not necessarily become an individual's acquired knowledge ^[9]. It becomes important then to explore the mechanisms and methods that enable and intensify the specific virtual experiences that potentially contribute to the development of IVC. According to Wang and Haggerty ^[8], organizations can play an important role in this process. The literature presented next suggests that such methods at the organizational level can be either formal, such as trainings, or informal, such as daily practices at work (Table 1).

Table 1 Practices Suggested by the Literature, by IVC Dimension

IVC dimension	Practices
Virtual self-efficacy ^[6]	I. Formal training on the correct utilization of computational tools ^[10] II. Formal training on effective work practices in virtual settings ^[10] III. Utilization of explicit virtual work and management practices by the leadership ^[10] IV. Infrastructure and technical support for virtual work development ^[10]
Virtual media skill ^[6]	V. Formal training on the utilization of ICT ^[9] VI. Formal training on techniques to increase the richness of the information exchanged through ICT ^[3]
Virtual social skill ^[6]	VII. Virtual learning environments ^[11] VIII. Utilization of social media ^[8] IX. Socialization through the observation of email distribution lists ^[12] X. Formal training on socialization techniques and etiquette for virtual settings ^[3]

Among the formal practices organizations may adopt to develop virtual self-efficacy, two are suggested by Staples et al. ^[10]: formal training on the correct utilization of computational tools and on techniques for effective virtual work, such as the clear definition of roles and objectives, efficient utilization of time, ease of access to other work partners and effective processing of information. The justification is that relevant training can provide individuals with information about their past performance accomplishments in a way similar to how it would occur if the individual had experienced the situation in real life. Therefore, relevant formal training can assist individuals in developing and consolidating their own self-confidence in using computer technologies and working remotely. Consequently, it would assist these individuals in developing their virtual self-efficacy.

Another method suggested by Staples et al. ^[10] to develop virtual self-efficacy is the observation of daily virtual work and management practices by other individuals, such as work partners and leadership. According to these authors, when individuals observe the successful practices adopted by others, they tend to develop their own confidence in utilizing and replicating those practices. That way, the utilization of explicit practices by the direct leadership – such as the establishment of rules for virtual meetings or to ensure communicative access to remote team members whenever required – can assist individuals in developing their virtual self-efficacy. Finally, Staples et al. ^[10] also mention that it is important for organizations to have proper infrastructure and technical support to fully support the technological needs of their employees during the execution of virtual work. According to these authors, proper technological infrastructure can help reduce the negative psychological impact on individuals about their ability to communicate and complete their work remotely, therefore increasing their virtual self-efficacy.

Formal training can also be useful in the development of virtual media skill. According to Carlson and Zmud ^[9], the individual’s perception of richness of a particular electronic media is associated with the knowledge this individual has about the technology utilized by the

media, the individual he/she is communicating with, and the organizational context in which communication is occurring. These authors suggest that among these three elements, the level of knowledge of the technology being used has the highest influence on the richness perception of the media, especially at initial stages when communication is being established for the first time. Therefore, they recommend formal training of individuals on the utilization of ICT as a method to build a base of technological knowledge that will support the future full exploration of ICT richness. Warkentin and Beranek ^[3] also suggest a collection of techniques that can help individuals “enrich” electronically mediated communication, such as: decreased response times for asynchronous media, the personalization of written messages, the utilization of diverse textual resources, and the avoidance of doubtful message content. Therefore, formal training that approaches such techniques might help individuals develop their virtual media skill.

As for social virtual skill, the literature suggests a series of practices that can help develop an individual’s ability to socialize in virtual settings. The utilization of e-learning is one of them. Wan et al ^[12] define e-learning as a virtual learning environment in which the interactions between students, learning material, and instructors are electronically mediated. This type of learning environment usually requires students to collaborate and to establish good relationships ^[13]. The group processes established within e-learning can therefore promote the development of virtual social skill. Another mechanism to develop this skill is the utilization of social media in the work environment ^[8]. The use of this type of media is an emergent trend that supports social contacts and effective information exchange between individuals and can therefore contribute to the development of virtual social skill. From this perspective, encouraging the utilization of such media in the workplace, even for contexts outside of work, can act as a potential mechanism to develop employees’ virtual social skills.

Focusing the socialization process of new members in virtual teams, Ahuja and Galvin ^[12] discuss the practice of using distribution lists of e-mails when communicating at the team level. According to these authors, when such lists are utilized, virtual team members become observers of a diverse set of behaviors and attitudes expressed during e-mail exchanges and can benefit from a socializing effect similarly as it would occur if they were directly observing the functioning of a traditional co-located group. Therefore, this practice potentially represents a passive method to facilitate the development of virtual social skill.

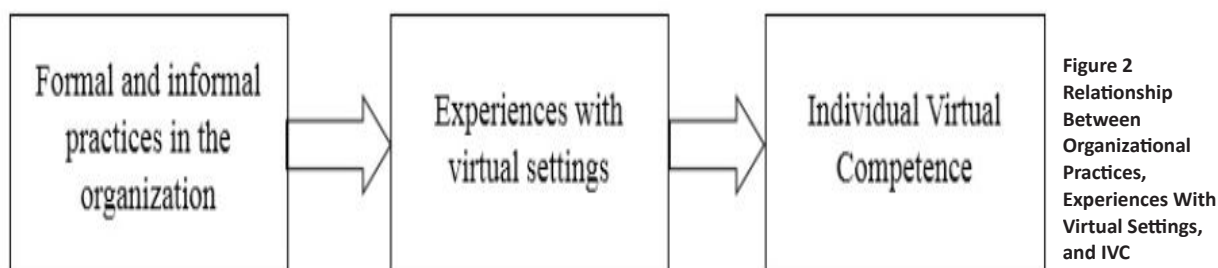
Finally, Warkentin and Beranek ^[3] demonstrate that although the socialization processes in virtual settings can be challenged by the limited richness of the social information exchanged via ICT, virtual work teams can be trained to increase the social content of the information exchanged electronically. These authors propose, for instance, techniques to promote social presence and interaction during virtual meetings, writing techniques for sharing social content and increased understanding of the social etiquette inherent to the virtual context.

3. Research model

According to Wang and Haggerty ^[6], IVC influences the knowledge transfer process in virtual settings due to its importance for the establishment of effective communication between the remote sender and recipient. Furthermore, these authors also suggest that past experiences with virtual work and communication can help individuals to develop IVC through a learning

process that affects its three constituent dimensions: virtual self-efficacy, virtual media skill, and virtual social skill.

The purpose of this study is to investigate formal and informal practices at the organizational level that can promote individuals' accumulation of the proper experiences with virtual settings and therefore contribute to the development of their IVC. It also aims to evaluate the dissemination of such practices by analyzing their adoption in two companies located in Brazil. Given the relevance of IVC to the success of the knowledge transfer process in virtual settings, it is expected that the development of such competence is a major concern for all companies that utilize any form of virtual work. Figure 2 illustrates the research model discussed.



METHODOLOGY

The qualitative case study methodology was utilized for this research. The case study methodology was selected because it is aligned with the need for the development and improvement of the understating of real-world events ^[14].

In this study, two teams, each belonging to a different multinational subsidiary located in Brazil, were selected. The selection criteria were based on the following team characteristics: the intensive utilization of work in virtual settings, the development of knowledge activities and the ease of access by the researchers. The focus of the analysis was on the formal and informal practices adopted by the company and by the direct leadership for the improvement of IVC in the members of the teams analyzed.

Data collection was supported by semi-structured interviews with the direct operational leader of each team and occurred during the month of April 2013. The interview questionnaire was composed of three main parts and an introductory section for the characterization of the company and work teams studied. Each section of the questionnaire was elaborated based on Table 1 and consisted of questions associated with the methods and practices identified in the literature for the development of each of the three IVC dimensions. The three main sections of the interview questionnaire are available in the Appendix and are identified according to the respective IVC dimensions they represent.

RESULTS

Company A is a Brazilian subsidiary of a large multinational IT service-provisioning company. The group studied at Company A corresponds to the regional onsite team that belongs to a global IT service-provisioning team. The global team is composed of several regional onsite teams throughout the globe, each of them responsible for providing the same type of IT service

to the respective client's subsidiary in that country. Therefore, it is extremely important for the regional onsite teams to work in synergy with the global team to ensure that similar levels of IT services are delivered to the client's subsidiaries throughout the globe. At the time of the interview, the work team at company A was composed of six members and one operational leader. They were responsible for the IT service management processes at the client's Brazilian subsidiary.

Company B is the Brazilian subsidiary of a large multinational automotive organization. The group studied at Company B is responsible for the development of IT innovations aimed at improving the company's internal product development processes. This team is part of a larger central IT development team located at the company's headquarters in the United States. Therefore, daily work for the members of the regional onsite team requires intensive virtual interaction with their international peers. At the time of interview, ten employees and one operational leader composed the work team at Company B. Table 2 presents the comparative analysis of both companies.

Table 2 Comparative Analysis of the Cases Studied

	Company A	Company B
Type of work developed by the team	IT service provisioning	IT development
Formal trainings	<ul style="list-style-type: none"> - Training on the use of corporate software and email/instant-messaging tools. - Training based on the simulation of virtual collaborative activities during crisis at the client's IT facilities. - Training on conflict resolution at the work place. 	<ul style="list-style-type: none"> - Training on the use of corporate software and email/instant-messaging tools.
Virtual work and management practices	<p>Yes. Weekly virtual staff meetings. Specific rules to ensure team members availability by cellphone and instant messaging tools. Individual performance evaluation system supported by virtual peers.</p>	No.
Virtual work infrastructure and technical support	<ul style="list-style-type: none"> - Notebooks, cellphones and mobile wireless networks. - Software for virtual meetings and teleconferences. - Remote access (VPN). - Help desk 	<ul style="list-style-type: none"> - Notebooks, cellphones and mobile wireless networks. - Software for virtual meetings and teleconferences. - Remote access (VPN). - Help desk
E-learning	Yes. Electronic learning environment with virtual classes. Mandatory monthly training quota.	Yes. Electronic learning environment with virtual classes.
Utilization of social media	Yes. Has its own social network, internal blog and tolerates the utilization of external social networks.	No. Partially tolerates the utilization of external social networks at designated times.
Utilization of email distribution lists	Yes. Intensive utilization. Employees have autonomy to create their own lists.	Yes. Restricted utilization. Formal process required for the creation of distribution lists.

DISCUSSION

Table 3 synthesizes the practices identified in the cases studied, which are organized per IVC dimension. The work team at Company A shows a larger number of practices for the development of IVC in comparison to the work team at Company B.

Table 3 Practices Identified in the Cases Studies

	Company A	Company B
Practices for the development of virtual self-efficacy	I, III, and IV	I and IV
Practices for the development of virtual media skill	V	V
Practices for the development of virtual social skill	VII, VIII, and IX	VII and IX

Note: Reference Table 1 for correspondence between indices and the practice description

Considering the practices associated with the development of virtual self-efficacy, neither of the studied companies utilizes formal training to support the effective execution of virtual work. Company A appears to already be dedicating some effort in this sense by offering training that simulates virtual work development during crisis situations at the client’s IT facilities. However, this can be considered only an isolated initiative that is not directly aimed at detailing the practices that contribute to the effectiveness of virtual work, as suggested by Staples et al. [10]. Company B, on the other hand, appears to be in an even more critical situation, as no virtual work and management practices were identified during the study. At Company A, the leader of the analyzed team establishes rules to ensure remote team members’ availability by cellphone or other electronic communication media. The objective behind this practice is to avoid the virtual setting becoming a barrier to the proper engagement of remote team members. Furthermore, the team has established weekly virtual staff meetings and utilizes an individual performance evaluation system for its members based on the feedback of virtual peers. According to Staples et al. [10], by observing such best practices in the work environment, individuals become more confident in developing effective work without face-to-face contact.

Analyzing the practices associated with the development of virtual media skill, both companies presented trainings on the correct utilization of ICT. However, virtual media skill encompasses aspects beyond the simple utilization of these tools and also involves the knowledge necessary to support the full exploration of the ICT potential [6]. Considering this perspective, neither of the studied companies presented formal training on practices to enrich electronically exchanged information or other similar techniques, as described by Warkentin and Beranek [3].

As for the practices associated with the development of virtual social skill, neither of the companies presented formal trainings on socialization techniques in virtual settings. Although Company A presented some initial efforts in this sense by having training on conflict resolution at the workplace, the training was not totally focused in the virtual context. Company B appears to have not yet explored the potential learning scenarios associated with the utilization of social media and email distribution lists by restricting the dissemination of their usage. As suggested in the literature [8] [12], such restrictions can constrain a potential method for the development

of social skills in virtual settings that requires almost no significant financial investments by the organizations.

In general, the companies studied already possess the physical infrastructure and elements that contribute to the development of the technical aspects of IVC, such as the provisioning of adequate IT tools and equipment, technical support and e-learning environments. Furthermore, these companies also dedicate a considerable amount of training to the utilization and manipulation of computational tools. However, the cases studied suggest that there are still opportunities for the development and implementation of practices associated with the non-technical aspects of IVC, such as training on techniques to enrich electronically exchanged information as well as training on effective work development in virtual settings and virtual socialization.

CONCLUSION

According to Hasty et al. [2], the challenges associated with the transfer of knowledge in virtual settings have been partially investigated. Wang and Haggerty [6] have researched this topic from the perspective of the individuals involved in the knowledge transfer process, and they presented the concept of IVC as a key competence to enable this process in virtual settings. Based on this concept, the present study aimed to increase the understanding of the potential mechanisms and methods that organizations may adopt to develop this core competence in their workforce and therefore contribute to their capacity to support the transfer of knowledge in virtual settings.

First, pertinent literature supported the uncovering of formal and informal organizational practices that can be used to develop each of the IVC dimensions. Second, a case study was conducted in an initial attempt to map the utilization of such practices in Brazilian companies. The results suggest that the studied organizations already possess the physical infrastructure and components to support the development of the technical aspects or dimensions of IVC. However, the development and dissemination of practices associated with the non-technical aspects of IVC appear to be in their nascent stages.

This study contributes to the literature by investigating the mechanisms that support the development of IVC and by specifically focusing the practices that can increase one's experience level with virtual settings, as suggested by Wang and Haggerty [6]. It also has practical implications by explicating the formal and informal practices that managers and organizations may adopt to improve workforce competence towards effective communication and the transfer of knowledge in virtual settings.

It is important, however, to highlight the limitations of this research. This study focused the practices to develop IVC mainly at the organizational level, neglecting the impact that day-to-day practices outside of the work environment may have over the IVC development of individuals. Currently, communication technologies are integral part of every person's life, and the interactions and technologies utilized at home can be very similar to the ones utilized at work. Therefore, online activities developed outside the workplace can provide additional opportunities for IVC development. In addition, this study does not assess how effective the formal and informal practices identified in the literature can be for the improvement of IVC. Future studies can explore these research opportunities.

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APPENDIX

Practices associated with the development of virtual self-efficacy

Does the company have formal training on the correct utilization of computational tools?

Does the company have formal training on effective work methods in virtual settings, such as a clear definition of roles and objectives, the efficient use of time, and the engagement of remote work partners?

Does the company/direct leadership establish explicit rules for the development of work in virtual settings, such as rules for virtual meetings or rules to ensure communicative availability for remote team members?

Does the company provide the proper IT equipment required to support virtual work as well as the technical support for IT issues commonly found during virtual work development?

Practices associated with the development of virtual media skill

Does the company have training on the utilization of ICT, such as email, instant messaging, teleconferences, and virtual conference rooms?

Does the company develop training on techniques to enrich the content of electronically exchanged information, such as a reduction of the response time for asynchronous media, the personalization of written messages, and the utilization of graphics?

Practices associated with the development of virtual social skill

Does the company conduct training in collaborative virtual learning environments, such as virtual classes or discussion forums?

Does the company have or stimulate the utilization of social media at the workplace, even for non-work-related subjects?

Does the company adopt the intensive utilization of email distribution lists for communication among employees?

Does the company have training on socialization techniques and etiquette for virtual settings? Examples utilization of emoticons and textual resources to transmit emphasis or feelings and the identification of expressions that can be misleading in electronic communication.