Adaptation within Virtual Teams: A Literature Systematic Review

Adaptação em Equipes Virtuais: Uma Revisão Sistemática da Literatura

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Abstract

Virtual teams is a growing theme in management literature. The adaptation processes of persons within a virtual team should consider the work the specific characteristics in such team work. The objective of the present study is to carry out a survey on the methods in the literature for a person adaptation within a virtual team. The research problem is: what methods are used in order to adapt new members within virtual teams? The theoretical approach is based on the traditional team literature and on studies about virtual teams. The methodology used is the systematic review. The results show three lines of actions for the person adaptation to virtual teams: the role of training methods, the mastering of information technology tools and the development of trust based relations among the persons. The research also shows the role of managers and leaders in virtual team management. This research showed the need to include the required capacities for virtual team work in educational institution curricula due to the increasing virtual team work environment. Further researches can also analyze how to develop trust based relations between virtual team members and leaders and between the two of them and the organization from the virtual relations which have to be rapidly developed and which are also rapidly terminated/disconnected at times.

KEYWORDS: Virtual Teams, Adaptation Processes, People Management. Virtual Team Management, Virtual Work.

Resumo

Equipes virtuais é um tema em crescimento na literatura de gestão. Os processos de adaptação das pessoas em uma equipe virtual devem considerar as características específicas do trabalho nessas equipes. O objetivo deste estudo é realizar um levantamento sobre os métodos apresentados na literatura para a adaptação de uma pessoa em uma

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equipe virtual. O problema de pesquisa é: quais métodos são utilizados para adaptar as pessoas que iniciam a sua participação em equipes virtuais? A abordagem teórica é fundamentada na literatura sobre equipes tradicionais e em estudos sobre equipes virtuais. A metodologia utilizada é a revisão sistemática. Os resultados evidenciaram três eixos de ações para a adaptação de pessoas às equipes virtuais: o papel dos métodos de treinamentos, o domínio das ferramentas de tecnologia da informação e o desenvolvimento de relações baseadas na confiança entre as pessoas. A pesquisa também mostra o papel de gestores e líderes na gestão de equipes virtuais. Essa pesquisa mostrou a necessidade de que as capacidades requeridas para o trabalho em equipes virtuais sejam incluídas nos currículos das instituições de ensino, visto ser crescente o trabalho em ambientes virtuais. Pesquisas futuras também podem analisar como desenvolver relações de confiança entre membros e líderes das equipes virtuais e entre esses e a organização, a partir de relacionamentos virtuais que precisam ser desenvolvidos rapidamente e também, por vezes, rapidamente são finalizados/desconectados.

Palavras-Chave: Equipes Virtuais. Processos de Adaptação. Gestão de Equipes Virtuais. Trabalho Virtual.

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1 Introduction

The ability to adapt persons within virtual teams is a critical one for the organizations in which work is increasingly accomplished in on-line modalities. The virtual team success depends on the team collaboration, on the development of flexible structures for the virtual work and on the knowledge management strategies (Cordes, 2016; Pfister & Oehl, 2009). In addition to the practioners of virtual team management, the researchers are also interested in understanding the adaptation processes of persons within virtual teams. According to Baard, Rench e Kozlowski (2014), such interest has led to the substantial increase in the number of researches in the two last decades.

Currently, the researches on virtual teams are grounded on team theories. Nonetheless, according to Gilson *et al.* (2015), in addition to the comprehensive literature on team work, adaptation is another important aspect in conducting practices and researches on virtual teams. Studies on virtual team work have highlighted the advantages and disadvantages to

define routines in virtual teams. As to the relation between routines and adaptation, Mattarelli *et al.* (2017) affirm that we still know surprisingly little about the processes in which a virtual team builds and rebuilds its routines over time, that is, it develops the capacity to adapt itself.

The adaptation process, according to Baard, Rench and Kozlowski (2014), has become prominent in the team literature. Most teams face interruptions which require adaptation; however, it is far more common in virtual teams due to its dynamic and often uncertain nature. Due to the geographical diversities and to a higher turnover of persons in organizations, adaptation is important for the success of the virtual teams (Gilson et al., 2015).

Furthermore, the persons who make up the virtual teams also need to adapt to the cultural diversities (Anawati & Craig, 2006). Such cultural adaptation within the virtual teams may become much more complex, depending on the numerical proportion of persons from different cultures in the team (Zhang et al., 2007). Virtual teams are also required to adapt to technologies, by seeking to use technologies in order to meet the needs of teams, of work projects and of organizations (Gilson et al., 2015; Qureshi & Vogel, 2001). Adaptation is, hence, a core feature for the practice of new researches both for virtual teams and for the traditional ones (Gilson et al., 2015).

The adaptation of beginners in virtual teams is, according to Gilson et al. (2015), one of the ten opportunities of further researches in the virtual team area. The objective of the present study is to carry out a survey about the literature methods for the adaptation of one person within a virtual team. The research problem is: what methods are used in order to adapt new members within virtual teams? The theoretical approach is grounded on comprehensive literature about traditional teams and on studies about virtual teams. The methodology used is the systematic review.

2 Adaptation within Virtual Teams

Virtual teams are characterized as a group of geographically scattered individuals from several cultures in different time zones and who communicate by information technology tools (Gilson *et al.*, 2015; Gilson, & Maynard, 2004; Lipnack & Stamps, 1997; Martins, Maznevski & Athanassiou, 2006; O'Leary & Cummings, 2007). The presence of virtual teams within organizations is increasingly common. (Zander, Zettinig, & Mäkelä, 2013).

In a virtual team, the persons interact by various communication electronic tools (Orta-Castañon *et al.*, 2017). Yet, by aiming at working efficiently within a virtual team, the persons also need to enhance their own competences. Some of these competences include: to avoid ethnocentrism, to communicate with different cultures and to understand how different cultures perform their processes; to choose the best communication electronic tools; to manage information in groups geographically separated; and to build trust even when face to face relations are not possible (Orta-Castañon *et al.*, 2017). Other necessary abilities include the capacity to work in teams, the capacity to work in virtual environments and the capacity to use any necessary technologies for the virtual work (Godin & Goette, 2013).

Virtual teams have unique characteristics, which should be taken into account during the adaptation process of the team new member. More efforts should be dedicated to the training of the person who effectively commences to work in virtual environments.

3 Literature Systematic Review: Methodological Procedures

In this article, a systematic review was performed in accordance with the process defined by Kitchenham (2004). Unlike the traditional literature reviews, a systematic review is a formal and rigorous research method that seeks to identify scientific knowledge in a given area by the selection, extraction and critical assessment of the findings of several approaches, which have already been carried out (Biolchini *et al.*, 2005). A systematic

review begins with the planning. In the following stage, the researches on the theme are identified. Afterwards, the studies are selected and the necessary information is extracted.

The systematic review was performed by using the Start tool (State of the Art Through Systematic Review) which was developed by the Laboratório de Pesquisa em Engenharia de Software (Research Lab of Software Engineering) (LaPES) of the University of São Carlos (UFSCar). The Start tool was used in the systematic review planning, in the selection of the studies of the on-line publication databases and in the extraction of the necessary information from the studies. The tool follows the same processes presented by Kitchenham (2004).

After having defined the included papers, they were read in full. Each one of them was summarized, by highlighting the methods used for the assessment and the considered parameters, according to each case. All the relevant information on the adaptation of new persons within virtual teams was extracted from the selected studies. For each article read in full, "data extraction forms" were filled out, considered as valid for the systematic review. In addition to the basic information (bibliographical data, publication date, summary, among others), these forms contain the summary of the study carried out by the researchers and their personal reflections about the study content and conclusions.

After reading and summarizing the selected studies, a subsequent technical report was prepared. This report contains the attributes, which were extracted from the searched studies: title of the article, name of the authors, publication year, methods for the adaptation within virtual teams. The research has identified the studies related to the inclusion criteria: to cover what is known about virtual teams and adaptation within virtual teams.

3.1 Review Planning

The systematic review started with the creation of a research protocol by describing the strategy used by the review. The strategy used in the research was the search for specific terminology from scientific article on-line databases either in English or in Portuguese from 2012 to 2017. The main selected terms were "virtual teams" and "adaptation". The main SR objective was to answer the research question (RQ): What methods are used in order to adapt new members within a virtual team?

The on-line databases of the selected scientific studies, which provided direct access to the studies in full, were: IEEE, Web of Science and Capes Scientific Journal Portal. Based on the research question, the keywords used in the research were defined as ""virtual team*" IN TITLE AND "adapt*" IN FULL-TEXT". These keywords were refined with the aid of some previously selected and already known studies (Anawati & Craig, 2006; Gilson et al., 2015).

The research keywords were adjusted to each of the databases of the studies (("*Document Title*": "*Virtual Team**") AND *adapt**) with publication date filters were used in the IEEE library from 2012 to 2017 and they were published in Conferences, Journals & Magazines. Title: ("*virtual team**") AND Topic: (*adapt**) were used in the Web of Science library from 2012 to 2017. Finally, on Capes Scientific Journal Portal, the keywords were "in the title it contains "*virtual team**" AND Any contains "*adapt**" by selecting the studies published from 2012 to 2017, reviewed by peers and which had been written either in English or in Portuguese.

3.2 Selection of Papers

The research conducted the survey of the published papers from 2012 to 2017 on the selected databases. The keywords versions defined for each databases were used on January 15, 2018, for the final selection of the published papers. A total of 122 studies in English and in Portuguese were obtained from the searches After selecting the studies, two distinct

selections were performed by using the inclusion criteria individually. In the first selection, the titles were read, the keywords and the summaries of the papers and 86 studies that addressed methods on the management of persons within virtual teams were selected. In the second selection, the studies were read in full and 11 papers, which addressed the adaptation of persons within virtual teams, were selected. Such selection was regulated according to the specified inclusion and exclusion criteria in the planning stage:

a) Inclusion criteria which were used:

1. Published and available papers in full on on-line scientific databases;

2. Papers published from 2012 to 2017;

3. Papers that address methods in order to adapt persons within virtual teams.

b) Exclusion criteria which were used:

1. Papers published as short articles and as posters.

2. Papers which do not address virtual teams.

3. Papers that do not address adaptation within virtual teams.

The selected studies were published in journals or in annals of events with peer review. As to the excluded ones, they did not address the theme on virtual teams and when they did so they did not include any method that could be used in the adaptation of persons within virtual settings.

4 Result Analysis

The results show how the educational institutions and the organizations in general qualify the persons who initiate their work within virtual teams. According to the conducted survey in the systematic review, the main methods in order to adapt new workers within a virtual team environment are:

1) To offer training within virtual teams (Cordes, 2016; Germain & McGuire, 2014; Godin & Goette, 2013; Martínez-Moreno *et al.*, 2014; Otieno, 2015; Trautrims, Defee, & Farris, 2016);

2) To master the collaboration technologies within virtual teams (Cordes, 2016; Germain & McGuire, 2014; Olson *et al.*, 2014; Trautrims, Defee, & Farris, 2016); and

3) To construct trust based relation (Cagiltay *et al.*, 2015; Cordes, 2016; Germain & McGuire, 2014; Olson *et al.*, 2014; Zaugg, Parkinson, & Magleby, 2015).

Organizations should offer training which considers the distributed work according to Cordes (2016). Gilson *et al.* (2015) state that several studies have been considering the training role within virtual teams. The researches relate training to several themes: cultural diversity (Holtbrügge, Schillo, Rogers, & Friedmann, 2011), team work (Rosen, Furst, & Blackburn, 2006) and technology use (Kanawattanachai & Yoo, 2007). According to (Dineen, 2005; Gilson *et al.*, 2015), training has proven to be particularly relevant for the persons with limited experience within virtual teams. Such fact can explain the popularity of studies focusing on student training methods for virtual teams (Berg, 2012; Gilson, Maynard & Bergiel, 2013). The training application within virtual teams increases the awareness and the performance of the apprentices in virtual work (Chen, Sager, Corbitt & Gardiner, 2008).

Facilitators and managers hold the main responsibility for the preparation of a productive and "healthy" virtual team. They need to have knowledge on how to prepare teams for the most challenging situations. Facilitators need to present skills and show knowledge in order to help guide the team members in search of results; they have to detect situations of conflict among the persons in order to make decisions and undertake necessary actions, by foreseeing the problems, and to use the technologies that enhance the collaborative work (Rosen *et al.*, 2006).

With the increasing use of virtual teams, Cagiltay, Bichelmeyer & Kaplan (2015) also suggest that the facilitation of teams requires a special set of skills which the team leaders may develop through training. Such training should address: team building   face to face sessions before creating the virtual teams; mastering of virtual team technologies; communication and personnel management abilities, including ongoing and constructive *feedbacks* (Orta-Castañon *et al.*, 2017). Thus, in order to effectively work in a virtual team, the persons need to enlarge their competence set. The person who works in a virtual team should avoid ethnocentrism when communicating with others from different cultures who also make up the team; he/she should know how to execute the several processes with persons from different cultures; he/she should choose the most adequate electronic communication tools to the project and to each work situation; he/she should know how to manage information in geographically separated groups, but at times virtually connected; and he/she should construct trust based relations.

In a survey on virtual team work, Olson *et al.* (2014) suggest some ways to prepare the leaders and the persons of a virtual team. The authors show the importance of formal training application focused on new technologies. The authors also suggest the careful management of technological changes and their implementation in the team work processes, aiming at a better result for the persons and for the organizations. Olson *et al.* (2014) show the need for greater attention towards the training before and during the adoption of new technologies.

Teaching persons of a team to think about the work processes and to analyse how they can contribute to team work is necessary, according to Martínez-Moreno *et al.* (2014). These authors also state that the team members should make their own decisions about how to solve their problems; they conclude that self-guided training may be useful for virtual teams. Otieno (2015) shows the use of games as team building tools.

Communication and information tools, as Cagiltay *et al.* (2015) analyse, are the most efficient means in order to teach persons how to collaborate within connected teams around the world. Cordes (2016) argue that the training for the collaborative tool use and for the virtual work process structuring are aspects of paramount importance for the instructors and for the virtual team learning. Cordes (2016) concludes that the virtual teams often need to return to the starting point: the reason or purpose of their creation. It is particularly important for organizations to have less experienced persons in virtual work. To teach persons of a team how to understand the dynamics between communication tools and the processes may reduce the uncertainties about the performance of tasks and allow the teams to spend more time accomplishing them.

Learning and collaborative work are challenging when the persons who are working together are from different nations with different socio-political cultures, histories and beliefs. Hence, collaborative environments will only be productive if the persons are technologically well prepared to face problems and to act in advance whenever it is possible (Cagiltay *et al.*, 2015). Communication and information technologies offer the necessary infrastructure so that individuals from different cultures and regions learn and work collaboratively (Cagiltay *et al.*, 2015).

The initial training is fundamental before beginning the virtual team work as Mitchell states (2012). The author affirms that such training can help instruct individuals on how to deal with cultural and linguistic barriers within virtual teams. For Germain & McGuire (2014), persons should be trained so that they are better leveraged by the teams. Human resources professionals (HR) should not assume that virtual teams are similar to the traditional ones. The adequate technological support and assistance are essential for the high performance virtual team development by including video interactions, for instance.

One of the roles of the virtual human resources departments (VHRD), according to Germain and McGuire (2014), is to favor the development of

trust among the virtual team persons. The technological issues should not be seen as a complement to virtual team work, as it is clear that having the correct software and technologies in operation is fundamental to the effective functioning of the teams. The VHRD professionals play an important role in the support and in the sustainability of the virtual team work, when guiding the choice and the adoption of technological interfaces. This can be done through case studies and team discussions, by helping the team members to be aware of the good practices for the virtual environment work.

Considering the implications both for the persons and for the organizations, the study by Olson *et al.* (2014) reveals the need for formal training and the integration between managers and leaders with the groups or the virtual teams. Managers and leaders need to develop sensibility in order to understand the training role for the use of new technologies and the implications of these technologies in order to achieve efficiency and results. Such sensibility makes managers and leaders understand that new technologies also produce negative consequences, that is, technologically competent individuals tend to continuously introduce new technologies without any justification for such. Nonetheless, ongoing training focused on each new technology demonstrates both a careful management of technological changes and the team well-being and the search for result for the organizations (Olson *et al.*, 2014).

With regard to trust, it is not inherent only to virtual team work. Trust is also necessary for non-virtual team work. However, in order to get efficient work done in a virtual environment, the virtual team persons need to develop trust-based relations much faster. Thus, understanding individual, team, organization and technology difficulties which affect the development of trust is essential to understand how such difficulties can be overcome (Germain & McGuire, 2014).

The ongoing adaptation processes within the teams should be supported by the organization values, as Mattarelgli *et al.* (2017) affirm. If

the team persons are not supported by the organization values, among them flexibility and innovation, the persons will probably encounter difficulty concerning the team adaptation processes. These authors observe that the persons who initiate their participation in a team adapt to the team routines and change/adapt to the team routines as well. For example, the knowledge sharing processes and the collaboration with the clients are better in persons who seek visibility and recognition in their projects.

The virtual team persons, when developing clear perceptions about their colleagues and the clients, are capable of creating more coherent routines; these persons dedicate themselves to collaborate and to promote new services for the clients (Mattarelli *et al.*, 2017). However, high levels of mutual knowledge combined with low perception about the others reduce the team capacity to adapt to existing routines and, as a consequence, make the teams stable, but less prone to face changes.

As the mutual knowledge among the persons of a virtual team increases, the need to find new ways to perform the tasks decreases. On the other hand, reducing the knowledge about the other persons and about the clients prevents the growth of teams, which forces them to redefine and to improve their processes anyhow.

Table 1 presents the summary of the methods extracted from the studies selected by the systematic review for the adaptation of new members within virtual teams.

Table 1. Methods for the adaptation of persons within a virtual team

Year	Authors	Methods for virtual team adaptation
2013	Godin and Goette	• To perform training within virtual teams • To master the collaboration technologies in teams
2014	Olson *et al.*	• To construct trust • To master collaboration technologies in teams
2014	Martínez-Moreno *et al.*	• To perform training within virtual teams • To provide *feedback* • To solve conflicts • To encourage personal training • To rotate responsibilities
2014	Germaine and McGuire	• To perform training within virtual teams • To construct trust • To master collaboration technologies in virtual teams
2015	Otieno	• To perform training within virtual teams • To foster creativity
2015	Cagiltay, Bichelmeyer and Kaplan	• To define objectives in a clear and more transparent possible way from the beginning • To establish personal relations to improve cultural intelligence • To increase openness to cultural diversity, respect, accept and tolerate differences • To verify the progress; To foster participation • To solve conflicts, avoid "taking part", clarify and solve problems • To give clear instructions, focus on questions and work for solutions • To provide immediate, positive, informative and constructive feedback about the results
2015	Zaugg, Parkinson and Magleby	• To contruct trust • To respect, accept and tolerate cultural differences • To establish personal relations in order to improve cultural intelligence
2016	Cordes	• To perform training within virtual teams • To construct trust • To focus on questions and work for solutions • To solve conflicts • To master the collaboration technologies in virtual teams;
2016	Trautrims, Defee and Farris.	• To perform training within virtual teams • To master the technologies in virtual teams
2017	Mattarelli *et al.*	• To develop the capacities of the team members • To adapt quickly • To encourage communication

Table 1. (continued)

Year	Authors	Methods for virtual team adaptation
2017	Orta-Castañon *et al.*	• To initiate actions of virtual team organization • To assume responsibilities • To define objectives and work independently • To support the others • To place the persons first and act with integrity, collaborate with other members when they face problems • To present written and verbal information in a coherent and logical way • To have clear analytical thought; be open to new ideas and experience • To seek learning opportunities • To trigger changes • To plan in advance, follow instructions and procedures • To adapt and respond well to changes • To administrate pressure in an effective way, concentrate on goals to be reached • To seek progress in the career with minimal support • To be aware of the cultural differences; demonstrate respect • To be able to divide the tasks in milestones, have a long-term and total conformity with the work flow and predefined processes in order to keep productive • To be proactive enough, ask help from other members to solve any problem and inform the virtual team leader about possible delays and changes. To construct networks with the team, interact in areas other than the work • To be trustworthy and honest with the others.

5 Conclusion and Research Implications

Students have been prepared to work in teams for years. Preparing young professionals for virtual team work has become equally important. Graduate students have to be able to work in the global labor market. Some of the necessary skills for such involve the capacity to work in a team, the capacity to work in virtual environments and the capacity to use any necessary technology for work accomplishment in virtual environments. The students who were preparing themselves in order to study and have new experience abroad can use the virtual team to start constructing new relations with the international colleagues/classmates.

There are some challenges (Orta-Castañon *et al.,* 2017) for the students who wish to experience virtual team work: the lack of effective communication in project key points (Cleary *et al.*, 2015); the lack of trust among the team members due to the geographical dispersion or to the cultural differences (Brewer *et al.*, 2015); an the misuse of the communication technologies (Brown, Thatcher & Wilson, 2016). The contact with workers in virtual teams, even before studying abroad, has the potential to improve future face to face intercultural relations (Zaugg, Parkinson, & Magleby,2015), due to the fact that the students are already familiar with their colleagues/classmates. Virtual contacts with virtual team members throughout the graduation course will help to prepare students and institutions for new cultural exchange opportunities and they can collaborate with the student personal and professional development.

Whenever it is possible, educational institutions, including the higher education ones, should make up virtual teams. Therefore, students will develop familiarity with technology and learn how to build trustworthy relations in the virtual environment. Virtual teams can help students to develop meaningful cultural exchange experience, which can increase and improve future interactions. The implementation of cultural and virtual activities, by using proper technological tools further collaborates with the student cultural and virtual learning. Yet, the instructors who may conduct the courses with a virtual approach should be more flexible with deadlines based on dates at the beginning of each semester and with time zones which may unfairly reduce the available time so that some students complete the assigned tasks.

Higher education institution professors have to make up their own virtual teams in order to discuss: possible eventualities, suitability of the technology used, efficient communication ways, expectations regarding the courses and the virtual teams. As an experience for the students' learning, the assessment of the virtual teams made up by students is less obvious, when compared to the ones based on face to face experience. According to

Trautrims, Defee and Farris (2016), most of the students notice when they really learn and they recognize the experience which they developed only after a reflection process.

In virtual teams, the students are exposed to a greater diversity, which is often a novelty for them, but which better prepares them for the globalized world reality. Even if this diversity level is available in the campus, the students do not necessarily engage with classmates from other backgrounds. Thus, the use of virtual teams, as part of the school and the academic assessment, makes the students leave their comfort zone and it makes them deal with new types of challenges (Trautrims, Defee, & Farris, 2016).

The learning process based on virtual team experiences requires the participation of students and educators. The teaching activities that boost the development of new competences in virtual teams should be focused on experiential learning and on real projects (Gonzalez-Perez *et al.*, 2014; Li, 2014). In these activities, the students develop competences such as planning, self-management and creativity in controlled environments (Bass, McDermott, & Lalchandani, 2015; Orta-Castañon *et al.*, 2017). The students need to develop these particular skills and practice them; it will help them to adapt gradually to new types of work (Gonzalez-perez *et al.*, 2014).

Collaboration in virtual teams offer innovative alternatives for education and it can also contribute to the development of new skills for the future labor market (Vance, Kulturel-Konak, & Konak, 2015). Further researches may list the capacities, which could be developed by the educational institutions in training sessions and how such training should be conducted in order to work effectively in virtual environments. Virtual work is increasingly present and, therefore, the educational institutions have to prepare persons for this new reality.

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