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SOCIAL REPRESENTATION OF THE INNOVATION CONCEPT: CROSS-COUNTRY IN BOLIVIA, BRAZIL, INDIA AND MEXICO

Representação social do conceito de inovação: Cross-Country na Bolívia, Brasil, Índia e México

Rodrigo Franklin Frogeri[1], Pedro dos Santos Portugal Júnior[1], Fabrício Pelloso Piurcosky[1], Meenu Bhardwaj[2], Juan-Carlos González-Islas[3], Juan Carlos Arroyo Mendizábal[4]
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ABSTRACT

The vagueness and confusion in the understanding of the concept of innovation by groups of individuals linked to different social contexts raises questions about how the concept of innovation can be formed at the level of the individual. The understanding of the concept of innovation may be varied and depend on idiographic cultural aspects or particular characteristics. Thus, the following questions arise: Can the meaning of innovation be varied and depend on idiographic cultural aspects such as country, age, gender, language, or social position (e.g., students, teachers, or professionals)? or (ii) Is the meaning of innovation independent of idiographic cultural aspects, but depends on the context of the individual? Researchers involved in this study are especially interested in understanding how groups of students, teachers, and Information Technology professionals in different cultural contexts perceive the concept of innovation. Social Representation Theory (SRT) was applied as the theoretical basis of the study. A quantitative and qualitative approach was adopted to a sample of 584 participants from four countries (Bolivia, Brazil, India and Mexico). The results suggest that the countries involved in the study do not have an innovation-oriented culture at the national level, but innovation may be part of some groups, especially in universities. Cultural parameters, not on a global or national level, but on an organizational or group level, may have the greatest influence on an individual's perception of the concept of innovation. The concept of innovation develops within the micro context in which the individual is embedded.
Keywords: Culture; Creativity; Educational institution; Social Representation; Universities.

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REPRESENTAÇÃO SOCIAL DO CONCEITO DE INOVAÇÃO: CROSS-COUNTRY NA BOLÍVIA, BRASIL, ÍNDIA E MÉXICO

Social representation of the innovation concept: Cross-Country in Bolivia, Brazil, India and Mexico

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RESUMO

A indefinição e confusão na compreensão do conceito de inovação por grupos de indivíduos ligados a diferentes contextos sociais levanta questões sobre como o conceito de inovação pode ser formado no nível do indivíduo. A compreensão do conceito de inovação pode ser variada e depender de aspectos culturais idiográficos ou características particulares. Assim, surgem as seguintes questões: O significado de inovação pode ser variado e depender de aspectos culturais idiográficos como país, idade, sexo, língua ou posição social (por exemplo, estudantes, professores ou profissionais)? ou (ii) o significado de inovação é independente dos aspectos culturais idiográficos, mas depende do contexto do indivíduo? Os pesquisadores envolvidos neste estudo estão especialmente interessados em entender como grupos de estudantes, professores e profissionais da área de Tecnologia da Informação em diferentes contextos culturais percebem o conceito de inovação. Como base teórica do estudo foi aplicada a Teoria da Representação Social (TSR). Adotou-se uma abordagem quantitativa e qualitativa a uma amostra de 584 participantes de quatro países (Bolívia, Brasil, Índia e México). Os resultados sugerem que os países envolvidos no estudo não possuem uma cultura orientada à inovação em nível nacional, mas a inovação pode fazer parte de alguns grupos, especialmente nas universidades. Os parâmetros culturais, não em nível global ou nacional, mas em nível organizacional ou de grupo, podem ter a maior influência na percepção do conceito de inovação de um indivíduo. O conceito de inovação se desenvolve dentro do micro contexto no qual o indivíduo está inserido.

Palavras-chave: Cultura; Criatividade; Instituição de ensino; Representação social; Universidades.

INTRODUCTION

Innovation in this contemporary world and in a multidisciplinary setting has more meaning than just involving the concept of 'something new'. The scope of innovation is constantly changing, and with change in technology 'innovation' can be correlated with invention, but not in an identical manner. Invention relates to creation of 'new' for the first time, whereas innovation is contributing to or improving the 'current' (Bhasin, 2012). An idea, or practice is what gives rise to creativity that creates a path towards innovation (Bhasin, 2012).

Cropley (2006) established the relationship between innovation and creativity, showcasing creativity as the driving force of innovation. Innovation is related to making a significant contribution to what is already prevailing in the market, bringing change in the current trends, and inbreeding the concept of 'better' or 'new' (Bhasin, 2012).

In this topsy-turvy world revolving around invention and creation, Innovation – metaphorically – is like a cement that holds the building (economic development) within the changing climatic conditions (policies). In the research findings of Mutlu and Nazli (2018), it was found that professionals from industries – including; tourism and hospitality, information technology, food and agriculture, medical health services, real estate, banking and finance, and energy and automotive industry – linked 'innovation' with 'being new', 'novel', and 'change'. The professionals' responses that were recorded for the study, interpreted innovation with 'development', 'improvement', and 'enhancement'. Whereas some professionals related innovation as a 'service' to present 'something new' to the market.

The vagueness and confusion in the understanding of the concept of innovation by groups of individuals linked to different societal contexts (Bhasin, 2012; Cropley, 2006; Mutlu & Nazli, 2018) raises questions in how the concept of innovation can be formed at the level of the individual. Moreover, the understanding of the concept of innovation can be varied and depend on idiographic cultural aspects (Tian, Deng, Zhang, & Salmador, 2018), associated with a country's own culture, the generation in which the individual was born (DeCusatis, 2008) or particular characteristics (Aichouni et al., 2015). People are part of a globalized world, and the definition of innovation may change its meaning with change in borders.

Thus, this paper tries to limit the challenges in understanding the meaning of 'innovation', being defined the following research questions: Can the meaning of Innovation be varied and depend on idiographic cultural aspects such as country, age, gender, language or social position (e.g., student, teacher or professional)? or (ii) Is the meaning of innovation independent of idiographic cultural aspects, but dependent on the individual's context? The aim of the study is to analyze whether cultural idiographic aspects influence different groups of individuals' understanding of the concept of innovation. It is believed that it is important to understand the elements that may or may not influence the understanding of the concept of innovation, since innovation, as an outcome of the innovation process, is strongly influenced by how organizations define the concept of innovation (Popa, Preda, & Boldea, 2010) and how individuals associate this concept with their daily lives (Mutlu & Nazli, 2018). We are especially interested in understanding how groups of students, teachers, and professionals in the field of Information Technology in different cultural contexts perceive the concept of innovation.

As a theoretical background for this study, it was used the Theory of Social Representation (TSR) proposed by Moscovici (2001). TSR aims to understand how common sense is formed, organized, grounded, and propagated in different human groups. Social representations are important in everyday life, in that there is always a need to know what a person or object has to do with the world around them (Marchisotti, Joia, & Carvalho, 2019). TRS has its origin in psychoanalysis and its focus in the literature is associated with humans and their relationships with society. However, in this study, social representation is applied to a concept (innovation) and not to an individual.

Methodologically, the study adopted a quantitative and qualitative approach applied to a sample of 584 participants from four countries (Bolivia, Brazil, India, and Mexico).

1 THEORETICAL REFERENCE

The theoretical background of the study was organized into five sections, namely: the first section discusses global parameters that may influence country residents' perception of the concept of innovation. Next, the perception of the concept of innovation from the perspective of students (undergraduates and postgraduates) (ii), professors (iii), and professionals (iv) are presented and discussed. Finally, in the last section, it was discussed the Theory of Social Representation (TSR).

1.1 Global parameters influencing the perception of countries' residents

Globalization plays a vital role in influencing innovation, giving access to information and resources across borders through a global connect (Bloch, 2007). Globally there are various parameters that act as an influencing factor in understanding the concept of innovation. Socio Economic development and growth along with other demographics are the essential elements of innovation (Cheung, 2014).

In earlier studies that are based on 'innovation', various issues related in understanding its concept were highlighted. Aslan, Duman, Sen, Duran and Atarbay (2016) considered 'innovation' as a base to 'profitability'. The study shows a positive relationship between collaboration of universities with various industries, as a means to influence 'innovation' in generating 'employment opportunities' through students (graduates, post-graduates) - empowering students to become employment providers. The universities as a whole perceive 'innovation' by the level of 'funding' that are generated in creating opportunities. A major limitation identified in the study of universities and their practices towards innovations was that the universities missed on creating a link between 'creativity' and 'innovation'.

Nager, Hart, Ezell and Atkinson (2016) have identified how the demographics influence innovation. Drawing from their conclusion it was found that the level of innovative thinking increases with increase in age up to 50 years, where peak influence is around the age of 30. It was found that gender as a factor also plays a vital role in the level of innovation in different countries. While talking about the USA, Nager et al. (2016) revealed that male to female ratio under the STEM program is dominated by the male participants, thus implying that individuals undertaking the STEM programs will have different perceptions on the definition of innovation than others. It was also suggested that innovation is dependent on the level of education in a country. The research brought forth that the higher the level of education, the higher is the understanding for innovation, bringing the fact that scientific innovation requires a greater level of education, and thus the multidisciplinary education system influences the socio-representation of innovation.

Innovation in a multidimensional setting is influenced differently under different cultural dimensions. Tian et al. (2018), in their research findings, stated that the influence of culture on innovation is ever going. We being global citizens are surrounded by conventions, which influen*ce* our innovation, which in turn is influenc*ed* by cultural engagement between and within nations. Understanding the concept of innovation in a multidimensional setting has its limitations, as the scope is vast.

Aichouni et al. (2015) in their paper talked about the impact of English proficiency on the level of innovative thinking of the students. They also discussed how the education level of the student's parents positively influences the level of creativity, whereas the income level of parents was considered to have lesser effect.

Innovation in a classroom and training environment is greatly impacted by the teachers' values and belief systems (Dyer et al., 2004). There are challenges in understanding these beliefs that influence teachers' initiative towards innovation in a learning environment.

1.2 Students' perception - Graduates, and Postgraduates - of Innovation in a global context

Students believe themselves as creative beings having unique identity in parallel to their entrepreneurial

instinct. The question arises, Is students' creativity linked with their meaning of innovation? Carayannis, Evans and Hanson (2003), in their research suggested that the students' creativity is the driving force for their innovative thinking, and there is a direct relationship between the two concepts. Therefore, in defining innovation there comes a challenge to explain 'creative thinking', 'creativity', and 'entrepreneurship' as a definitive concept that stays pervasive in all dimensions of innovation. Yet previous research also suggests that 'creativity' is a missing concept in engineering education.

In the recent research conducted by Edwards, Sánchez-Ruiz, Tovar-Caro and Ballester-Sarrias (2009) on a sample of 119 students with engineering backgrounds via questionnaire-based methodology revealed challenges in distinguishing the concept of innovation, creativity, research and development, and invention. The students' ideas were considered 'vague', and 'incomplete' due to lack of training in innovation.

Research conducted by Law and Breznik (2017) on 998 students compared engineering and non-engineering students of both genders - at under-graduate and postgraduate level. In relation to their attitude towards innovation, the research identified four major attitudinal antecedents and their impact on entrepreneurial intentions. The highlights are – first, motivation of learning is correlated to innovation. Second, age plays an important role in the level of motivation towards learning and innovation instinct, as the level of education varies in inbreeding motivation among graduates and postgraduates. Thirdly, engineering students are inclined greatly towards 'self-efficacy' in correlation to their 'attitude'. Fourthly, innovation is an influencing factor among male students than their counterparts. The research identified limitations in relations to the scope of innovation. The research suggested that extensive demographic parameters to be incorporated and students' inclusion beyond borders must be studied in bringing out a comprehensive understanding of the term 'innovation'.

In the light of cultural and non-cultural products, under the study by Oakley, Sperry and Pratt (2008), it revealed that 'artwork' is subject to creativity, however contrary, it is considered 'something that presents no purpose'.

1.3 Teachers' perception on innovation in a global context

Errington (2004) under his paper brought to light that teachers play an essential role in building the concept of innovation in an ambiance of an educational environment. Teachers' significant impact on innovation by influencing what can be achieved is relevant according to their perspective and learning outcomes. Teachers are influenced by their own beliefs in understanding the term innovation, which is determined by what is - *possible, relevant, and worthwhile.* The notion of 'support' is also considered to influence teacher's innovation in teaching and learning. *"Innovation is seen as a result of learning ability".*

In the learning environment, it is a challenge to engage teachers who have their own perceptions and beliefs in understanding the term 'innovation', this results in a contradiction in pedagogy on the mind of students due to students' failure to engage with teachers' deep-rooted cultural attitudes and differences (which is inclusive of caste, hierarchy and social inequality), making it strenuous for the current practices to change (Brinkmann, 2016). This resistance of understanding among the students and teachers creates complex conditions in conceptually defining innovation under one head.

Yatigammana, Johar and Gunawardhana (2014) discuss the Diffusion of Innovation theory (DOI) as an instrumental in bringing out the assumptions in defining innovation under various fields of study. The concept of DOI is essential in determining the factors which affect the adoption of innovation, as educational technology is looked upon as a method of 'innovation'. Creating the roadmap of framing the boundaries of innovation, the previous research studied for the objective of this paper brings out – compatibility, complexity, trialability, relativity, and observability, as the measuring factor in understanding innovation in the teaching environment (Yatigammana et al., 2014).

The boundaries defined under Compatibility – dimensions – is the extent to which innovation is perceived in accordance with the previous or existing belief system, and values that have a direct or inverse effect on the attitude of an individual. On the contrary, under Complexity, innovation is perceived as a measure of difficulty in understanding; adoption, and its usage. Similarly, Trialability involves rigorous attempts towards adoption of

innovation. On the other side of the road – dimensions – of innovation is Observability, which emphasizes on the visibility of results to the individuals, which entails their adoption towards innovation (Yatigammana et al., 2014).

1.4 Professionals' perception on innovation in a global context

In recent years, science, technological development and innovation have largely driven the global economic and social development of countries. The growth and consolidation of national and regional economies has been based mainly on technology and entrepreneurship (Law & Breznik, 2017; Rae, 2017). The innovation promoted by technology-based companies has allowed them to establish policies for the generation of employment and wealth. The adoption of technology in western culture has been widely implemented, while in the context of SMEs in developing countries recently it is of great interest, both public and private sector companies. In the work developed by Hanadi and Aruna (2013) the objectives were to measure the impact of the adoption of technology on the managerial attitude and organizational performance of SMEs. The results showed that the adoption of technology innovation influences the improvement of the performance of SMEs and that the perception of the use of technology leads to a behavior of use of innovation at the organizational level.

Innovation as a global tendency to build a sustainable and inclusive future requires determining who will finance innovation throughout the world, which is the subject presented in the 2020 global index (Dutta, Lanvin, & Wunsch-Vincent, 2020). A key challenge facing any innovator around the world is financing mechanisms, as financing affects all stages of an innovation cycle, from idealization, commercialization, expansion and long-term business sustainability. Even before the COVID-19 crisis in Santiago, new proposals such as sovereign wealth funds and non-profit organizations have supported innovation. Corporate companies, intellectual property (IP) markets, crowdfunding and fintech solutions are mechanisms that began before the crisis and will continue to age. Collaterally, derived from the current crisis, innovation in solutions for health, remote work, distance education, electronic commerce and mobility solutions have been promoted .

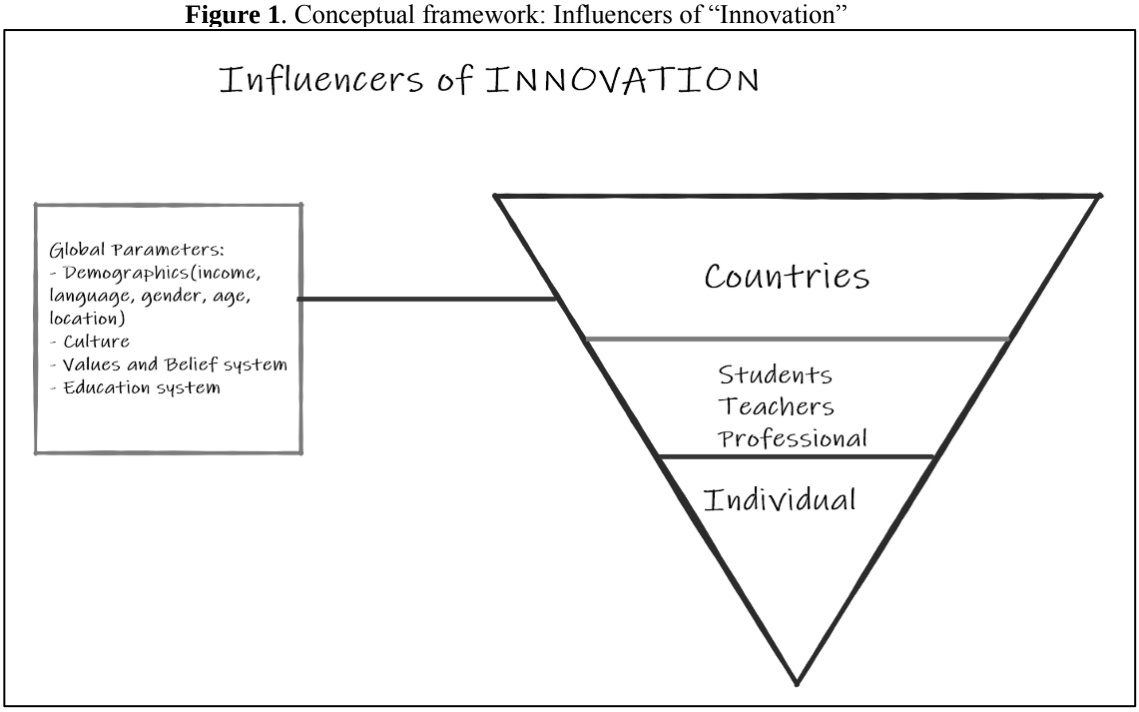
The competitiveness and cooperation issues of macroeconomies at the organizational level imply the development of basic economic mechanisms, strategic innovation, organizational renewal and optimization of production are some of these. Vlados, Deniozos, and Chatzinikolaou (2018) have carried out a study to determine what types of in-use and new innovation mechanisms are required in a new restructuring model after a global crisis. Vlados et. al (2018) concluded that innovation is part of the success of different social organizations in the global dynamics of restructuring society, which will end up benefiting contemporary socioeconomic development.

Since years ago, there has been an interest in determining the perception of innovation in a global context, for example Pope (1997) sought to determine the innovation approach preferences of computer professionals and to examine the relationship between MBTI personality perception (Sensing or Intuition) and innovation approach preferences (Conceptual, Normative, Methodical, and Spontaneous). Pope's (1997) study involved 27 professionals from the same company and the results pointed out significant differences in innovation approach preferences among IT professionals.

Iorgulescu and Răvar (2013) aimed to identify the degree that innovation is perceived as important for hotel managers in Romania. The study reveals that managers consider innovation an important tool for achieving competitive advantage, but appreciate most the importance of the quality-price ratio, comfort level and the brand of the hotel they work in. Moreover, although hotel managers consider important all types of innovation, they state that their hotels do not innovate frequently.

According to the previous sections, it is suggested a conceptual framework of influencers factors of innovation concept (Figure 1).

Figure 1. Conceptual framework: Influencers of "Innovation"



Source: Developed by the authors (2021)

The conceptual framework of innovation influencers (Figure 1) presents global parameters (demographic aspects, culture, values and belief systems, and educational system) that can influence innovation at the level of countries, students, teachers, professionals, and at the individual level.

1.5 Theory of Social Representation

The Theory of Social Representation (TSR) has its foundations in the study by Serge Moscovici, developed in the decade of 1960 in France. Moscovici sought to understand how the common sense develops, organizes, establishes and spreads itself in different human groups (Moscovici, 1978, 2001). According to Moscovici (1978), it is in the light of the representations that people make of certain social object or concept – and not necessarily of the reality – is that individuals and collectives perform their everyday actions as are carried out.

For Jodelet (2001), social representations are important in everyday life, to the extent that there is always the need to know what a person or object has to do with the world around us (Marchisotti et al., 2019). Jodelet (2001, p. 22) complements that "social representations are a form of knowledge, socially elaborated and shared – with a practical goal – and that contributes to the construction of a reality, common to a social set". TSR is based as a discipline in motion, doubly targeted by the relationship between the 'individual' and 'social' (Marková, 2017; Pawlowski et al., 2004).

It is argued that the social representation develops itself through two distinct processes, but that complement each other, namely: anchoring and objectification (Jodelet, 2001; Moscovici, 2001). **Anchoring** is understood as the recognition of a new object by a certain group of individuals. Anchoring is associated with the construction of representations of new objects based on the representation of familiar objects (Jodelet, 2001; Moscovici, 2001). People convert the social object into an instrument that they may have, this object is associated with a wide range of preferences within the existing social relations (Teodoro, Przeybilovicz, & Cunha, 2014; Vaast, 2007). In the **objectification** a new object is integrated into the common sense reality, builds up a picture of the new object and this image sets the new object as part of the community social reality (Moscovici, 2001). Objectification is characterized by the communication and sharing of new object until it becomes a real conceptual schema, which can be embodied in an image (Moscovici, 2001; Teodoro et al., 2014; Vaast, 2007).

Elements that complement the foundations of TSR are the central core and peripheral system of social representations (Moscovici, 2001; Vergara & Ferreira, 2005). The **central core** is associated with the values that, in general, the individual has no awareness or values that are not explicit, but that direct their actions and behaviour (Marchisotti et al., 2019; Vergara & Ferreira, 2005). The central core can be seen as a subset of composite representations of some elements which, in its absence, alter its meaning (Abric, 2003). For Vergara and Ferreira (2005), within a historical and cultural context, the central core becomes decisive for the direction that a given object takes to a group. Abric (2003) notes that the central core is surrounded by a peripheral and flexible system that accommodates contextual and immediatist contradictions without affecting the central core (Marchisotti et al., 2019; Vergara & Ferreira, 2005).

Under a relational perspective between the elements of TSR, it is possible to consider that anchoring has a personal feature, associated with the cultural and historical context, and to the personal experiences which form the **peripheral system** of each individual. The objectification is associated to the concrete, the common consensus of a group to which the individual is part and highlights the concept of central core. The observation of the central core in a social representation is essential to its understanding; however, the peripheral system cannot be ignored because it is linked to the individual who, in turn, is associated with the observed group (Marchisotti et al., 2019; Vergara & Ferreira, 2005).

Despite the Theory of Social Representation being applied in studies of different areas of knowledge, including in the field of Information Systems (Correia & Joia, 2014; Joia & Melon, 2019), limitations of this theory must be discussed and presented. The positioning of the social representation of individuals and societies simultaneously led to criticism of contradictory social determinism and cognitive reduction that the theory may be subject (Voelklein & Howarth, 2005). The most common criticism of the TSR is that it is so wide and at the same time so vague (Voelklein & Howarth, 2005). Voelklein and Howarth (2005) suggest that it makes more sense to characterize than to define social representations due to their dynamics. TSR's position within the triadic asymmetry of the self, the other and the object, suggests that social representations may be very volatile and will change over time (Voelklein & Howarth, 2005).

2 RESEARCH METHODOLOGY

Methodologically the study is characterized as qualitative and quantitative approach, inductive logic and interpretivist epistemology. Respondents should inform the language they wished to use to respond, initially, a socioeconomic questionnaire and the three open questions/phrases, as shown in Table 1.

Table 1 - Questions that comprised the online questionnaire of the study

Number	Question/Sentence
Q1	For you, Innovation is...
Q2	For you, Innovation is related to...
Q3	What are five words that come to your mind when you think about Innovation? Consider the FIRST word as the MOST RELEVANT and the LAST and the LESS RELEVANT.

The questions/phrases in Table 1 were adapted from studies, Teodoro et al. (2014) and Marchisotti et al. (2019) to the context of this work. It has been adopted a non-probabilistic sample per accessibility (Vergara, 2016). Following the recommendations of Lee and Baskerville (2003) on generalization in research in the field of Information Systems, we adopted the generalization of the EE type (generalization of data for descriptions). The generalization of the EE type suggests that the product of the generalization is a description, and the following conditions must be satisfied: (i) the sampling must be done randomly; and (ii) the population being sampled must not be distributed evenly. The generalization of the EE type (Lee & Baskerville, 2003) is especially suitable for

studies involving TSR due to the dynamic characteristic of this theory, in which it is suggested to characterize instead of defining social representations (Voelklein & Howarth, 2005).

We believe that the application of the study in four different countries guarantees the conditions suggested by Lee and Baskerville (2003). In addition, "with regard to generalizability (generalizability Type EE) in sample-based statistical inference, an increase in sample size may increase the generalizability of the sample points to a sample estimate, but does not increase the generalizability of the sample estimate to the corresponding population characteristic" (Lee & Baskerville, 2003, p. 234).

Wachelke, Wolter and Matos (2016) present observations similar to those of Lee and Baskerville (2003) when discussing the sample size in studies involving TSR. For Wachelke et al. (2016, p. 159) "as we have larger samples, grows on one hand the diversity of possible responses and increases the scope for differentiation of some elements. The construction of quadrants by the same criteria may result in different settings as the change sample sizes". Wachelke et al. (2016) suggest samples between 100 and 200 cases for studies applying the four-house quadrant of Verges (1994). Samples between 25 and 50 participants are not recommended, as they have high variability and low coincidence with the larger sample. (Wachelke et al., 2016).

Following Abric's recommendations (2003), data collection was performed by means of the word evocation technique (Table 1 - Q3), and data processing by means of the technique in the four-house quadrant proposed by Vergès (1994) or array of evocations, according to Teodoro et al. (2014) – see Table 2. Pereira (2005) considers that the technique developed by Vergès (1994) crosses the frequencies of evocations (quantitative nature) with the orders of the evocations (qualitative nature) to build a table of contingencies of four quadrants separated by these intersections.

According to Cristo (2012), the software that best fits to the analysis of social representation and that applies, by default, the quadrant of Vérges (1994) is the EVOC. EVOC software enables statistical calculations and builds arrays of co-occurrences - basis for the construction of the four-houses quadrant. Furthermore, an important outcome of the software is the clustering of the words into categories and their placement into Vergès' four-house quadrant (Vergès, 2003). However, the EVOC software has a cost for its use. The authors of this study decided to use a similar and free software, called openEVOC[1] version 0.84, developed by Cristo (2012). Hereupon, in Table 2, is presented the four-house quadrant proposed by Vergès (1994) or array of evocations (Joia & Melon, 2019) according openEVOC (Cristo, 2012) data organization.

Table 2 - Array of evocations

		LOW	**HIGH**
		% of frequency of the words evoked	
HIGH	**Average of evocations order**	LOW percentage of frequency the word was evoked (LFE) (frequency of evoking the words). HIGH average in the order of evocation (LRE) (words evoked many times in the last positions). **(D)**	HIGH percentage of frequency the word was evoked (MFE) HIGH average in the order of evocation (LRE) (words evoked many times in the last positions) **Peripheral System** **(B)**
LOW		LOW percentage of frequency the word was evoked (LFE). LOW average in the order of evocation (MRE) **(C)**	HIGH percentage of frequency the word was evoked (MFE) LOW average in the order of evocation (words evoked many times in the first positions) (MRE) **Central Kernel** **(A)**

[1] Available at <http://www.hugocristo.com.br/>. Access in 9 April 2021.

Source: Adapted from Joia and Melon (2019) according Cristo (2012).

Each of Vergés's quadrants (1994) has a meaning, as suggested by Guimelli and Rouquette (1992), namely: (i) first quadrant (A): indicates the central nucleus of the representation - is linked to the collective memory and the history of the group; consensus is - defines the homogeneity of the group; hear the immediate context sensitive, meaning generating the representation; determines your organization. In this quadrant there are categories with evocation frequency higher than the average evocation frequency (Most Frequency Evocation - MFE) and evocation order below the average value (Most Readily Evocation - MRE) (Guimelli & Rouquette, 1992); (ii) the second (B) and (iii) third quadrant (C) correspond to the categories with less emphasis on representation structure - allows the integration of individual histories and experiences, support the heterogeneity of the group, they are sensitive to immediate context, allow adaptation to reality; allow differentiation of content; protect the central system. In the second quadrant are the categories that obtained a high frequency of evocation (MFE), but which were less readily evoked (Less Readily Evocation - LRE). In the third quadrant are the categories that were mentioned with low frequency (Less Frequently Evocation - LFE), but that were mentioned first (MRE). Both quadrants (B and C) have a close relationship with the central nucleus (Guimelli & Rouquette, 1992); (iv) the fourth quadrant (D) represents the categories that are most distant from the central nucleus, being considered peripheral elements since they combine a lower evocation frequency (LFE) and were late evoked (LRE).

In addition to the word evocation technique, the respondents should complete two sentences (Table 1 – Q1 and Q2). These phrases were analysed by means lexical analysis technique (Marchand & Ratinaud, 2012). The lexical analysis was performed with the aid of the Iramuteq software, version 0.7 alpha 2 (Marchand & Ratinaud, 2012). Using the software Iramuteq, we applied the analyses of cloud of words and similarity to the textual bodies of questions 1 and 2 (Table 1). According to Marchand and Ratinaud (2012), the cloud of words is the simplest lexical analysis; however, it is rather informative. In this technique, the words are grouped together and presented as graphs. The analysis of similarity, in turn, allows the presentation of the connectivity structure between the words of a textual corpus (Marchand & Ratinaud, 2012). For Mendes, Zangão, Gemito e Serra (2016, p. 347), the ‘analysis of similarity or similarities is based on the graph theory, because a graph is the ideal mathematical model for the study of the relationship between discrete objects of any type and allows to identify the co-occurrences between words and their outcome’.

Finally, for data treatment, the responses presented in Spanish and Brazilian Portuguese were translated into English. The process of translating the Spanish and Brazilian Portuguese texts followed the recommendations suggested by Clark, Birkhead, Fernandez and Egger (2017) for translating data collected in cross-cultural research teams. The process of translating the data collected in the four countries was facilitated by the fact that the researchers involved in the research were fluent in English in addition to their native language (three researchers are native Brazilian Portuguese speakers, two other researchers are native Spanish speakers, and one researcher is a native English speakers).

3 RESULTS AND DISCUSSION

The analyses of the collected data were divided into three moments that complement each other. The first analyses (exploratory and frequency) aim to describe, in general, the data and test their suitability for further analyses. In a second moment, we performed Lexical Analysis via Iramuteq software of the qualitative data presented in questions Q1 and Q2 of the research questionnaire. Finally, we performed the analyses of the words evoked by the respondents by means of the Verge quadrant via openEvoc software.

3.1 Exploratory and Frequency Analysis

A total of 584 responses were collected from the four countries involved in the study. After processing the data and analyzing the appropriateness of the responses to the study objective, a total of 550 responses were

considered valid. Table 1 below presents the survey data broken down by gender, country of residence, and current position of the respondent.

Table 3. Distribution of respondents by gender, country of residence and current position

	Female		**Male**		**Total**	
		%		**%**		%
Bolivia	**43**	**7,82%**	**57**	**10,36**	**100**	**18,18**
Professional	11	2,00%	28	5,09	39	7,09
Student	25	4,55%	15	2,73	40	7,27
Teacher	7	1,27%	14	2,55	21	3,82
Brazil	**51**	**9,27%**	**84**	**15,27**	**135**	**24,55**
Professional	15	2,73%	50	9,09	65	11,82
Student	33	6,00%	30	5,45	63	11,45
Teacher	3	0,55%	4	0,73	7	1,27
India	**84**	**15,27%**	**57**	**10,36**	**141**	**25,64**
Professional	15	2,73%	23	4,18	38	6,91
Student	59	10,73%	32	5,82	91	16,55
Teacher	10	1,82%	2	0,36	12	2,18
Mexico	**34**	**6,18%**	**140**	**25,45**	**174**	**31,64**
Professional	8	1,45%	44	8,00	52	9,45
Student	22	4,00%	73	13,27	95	17,27
Teacher	4	0,73%	23	4,18	27	4,91
Total	**212**	**38,55%**	**338**	**61,45**	**550**	**100,00**

Table 3 data denotes a balance in the number of respondents among the countries involved in the study (Bolivia = 100 - 18.2%, Brazil = 135 - 24.5%, Mexico = 174 - 31.6% and India = 141 - 25.6%). The current labor market position of the respondents shows a larger group of students in STEM fields (289 - 52.5%), followed by professionals from different fields of knowledge, but with a predominance of STEM professionals (194 - 35.3%) and teachers also from STEM fields (67 - 12.2%). Within the group of participants in the survey there is a predominance of students, professionals and teachers linked to the areas of Civil Engineering, Mechatronic Engineering, Telecommunications Engineering, Information Systems, Computer Science, Information Technology and Systems Engineering. Other participants, but in smaller numbers, are linked to the fields of Medical Sciences, Business Administration, Architecture, Graphic Design, and Mathematics.

For further analyses to have valid statistical foundations, it was created the contingency table between the nominal categorical variables country of residence and current position of the respondents (Table 4) and performed the chi-square test (Table 5).

Table 4. Contingency table between respondents' country of residence and current position

Residence country	**Current Position**			**Total**
	Student	**Professional**	**Teacher**	
Bolivia	40	39	21	100
Brazil	63	65	7	135
India	91	38	12	141
Mexico	95	52	27	174

Residence country	Current Position			Total
	Student	Professional	Teacher	
Total	**289**	**194**	**67**	**550**

Table 5. Chi-square test based on Table 4

χ^2 Tests

	Value	df	p
χ^2	33.8	6	< .001
N	550		

The chi-square test suggests that the data arranged in the contingency table between the respondent's country of residence (Bolivia, Brazil, Mexico or India) and his current position (student, professional or teacher) are related ($p < .001$), rejecting the null hypothesis H0 that the variables are independent.

3.2 Lexical Analysis of questions Q1 and Q2

The study participants were asked to answer what the word Innovation meant to them (Q1 - For you, Innovation is...) and to what the word Innovation was related (Q2 - For you, Innovation is related to...). Through word cloud and similarity analyses, we generated the groups of Figure 2 and **Erro! Fonte de referência não encontrada.**.*Figure 2*

Figure 2. Word Cloud to Q1 (Innovation is...) according to the respondent's current position

(i) 2516 words analyzed	(ii) 1449 words analyzed	(iii) 532 words analyzed
		

(i) Students, (ii) Professionals and (iii) Teachers.

Figure 2 allows us to observe that the words '**new** - frequency equal to 139' and '**something** – 101' stood out in the students group, while in the professionals group the same words had higher frequencies (**new** - 94, **something** - 56, **create** - 34, **improve** - 31 and **idea** - 26). The teachers' group did not diverge from the other groups, with the words '**new** – 21', '**improve** – 10', '**idea** – 10', '**thing** – 9' and '**change** – 9' having the highest frequencies.

To complement the word cloud analysis, we performed a similarity analysis for the same text corpus that generated the word cloud (Q1).

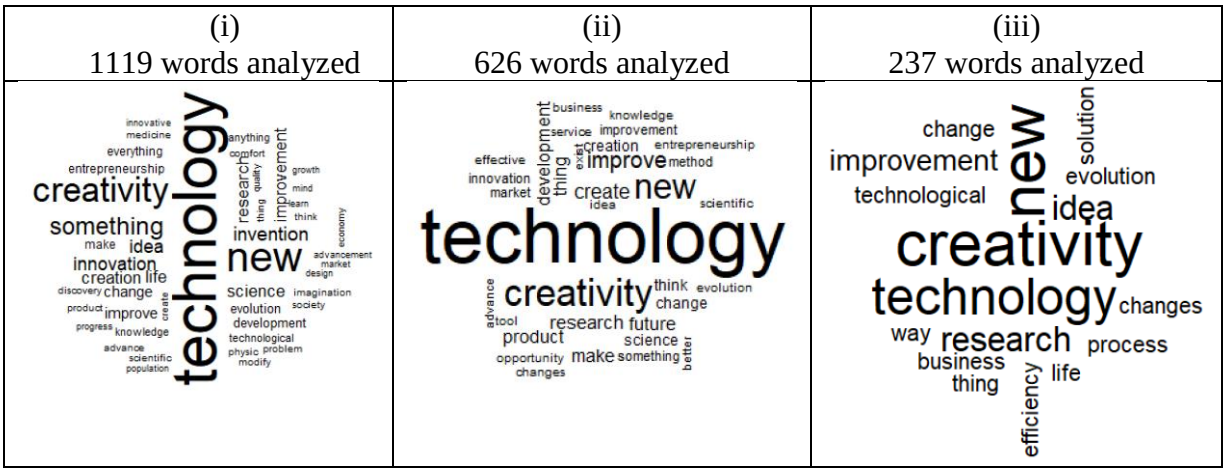
According to the similarity analysis generated by the Iramuteq software, the three groups present similar central words in the structure of the sentences that composed the answers to question Q1. However, these words are presented differently. The term '**improve**' used by the student group has a greater association with existing

processes and services (exist). The group of professionals uses the term '**improve**' associated with methods, development, thinking and things. The central term '**create**', for the student group, is more related to 'thing' and 'idea' while for the professional group it is more associated with ideas, processes, market and products.

The group of teachers, due to the smaller number in the sample, has a simpler analysis, but it is possible to observe a central structure based on the words '**improve**', '**product**', '**thing**' and '**process**'. In summary, for the three groups analyzed, Innovation is the improvement of processes, things and products or the creation of new ideas, new products, new things or new processes. We can identify in the analyses that there is some confusion in the answers between the concept of invention and innovation. Bhasin (2012) considers that invention relates to creation of 'new' for the first time, whereas innovation is contributing to or improving the 'current' - an idea, or practice is what gives rise to creativity that creates a path towards innovation.

Question Q2 aimed to identify to what the respondents relate the term Innovation (Q2 - Innovation is related to...).

Figure 3. Word cloud to Q2 (Innovation is related to...) according to the respondent's current position

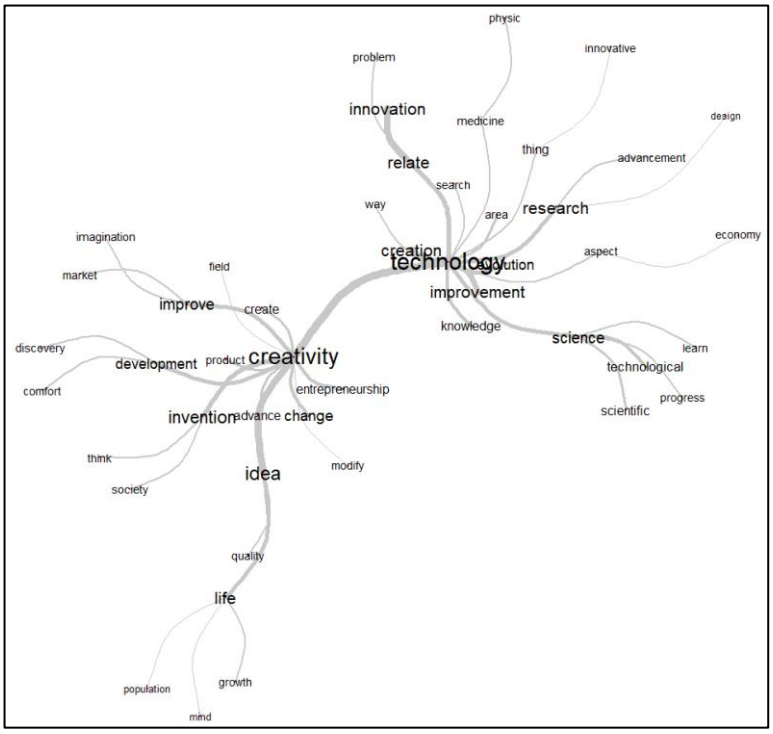


(i) Students, (ii) Professionals and (iii) Teachers

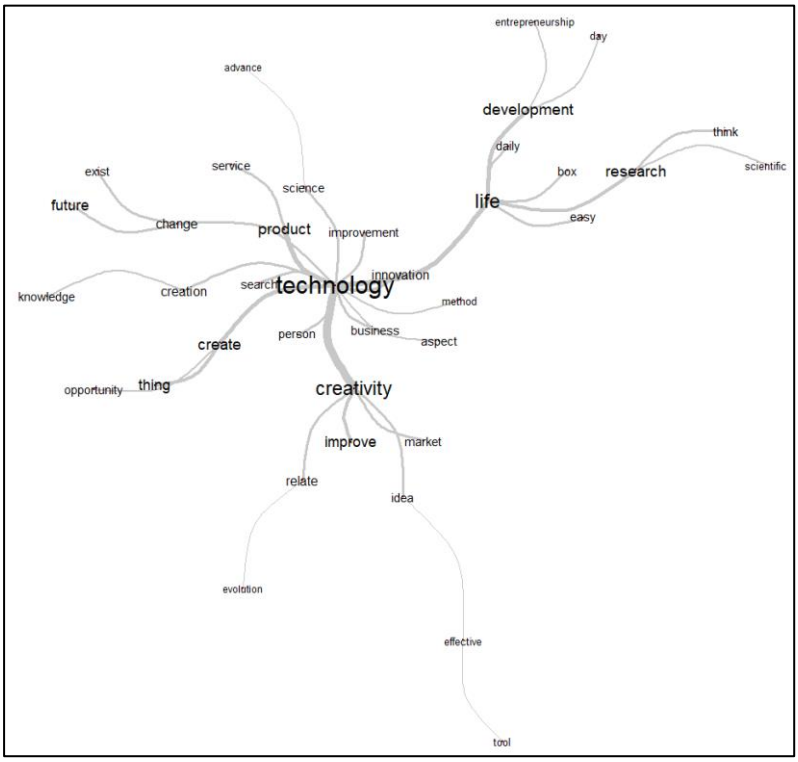
The student group highlighted the words technology (61), new (40) and creativity (33) as the words most related to the term innovation. The professionals group presented results very similar to the students group, highlighting the words technology (42), creativity (19) and new (16). The teachers group followed a trend similar to the other groups, highlighting the words creativity (10), new (10) and technology (8) as related to Innovation. Next,

Figure ***4***, we present the similarity analyses for question Q2.

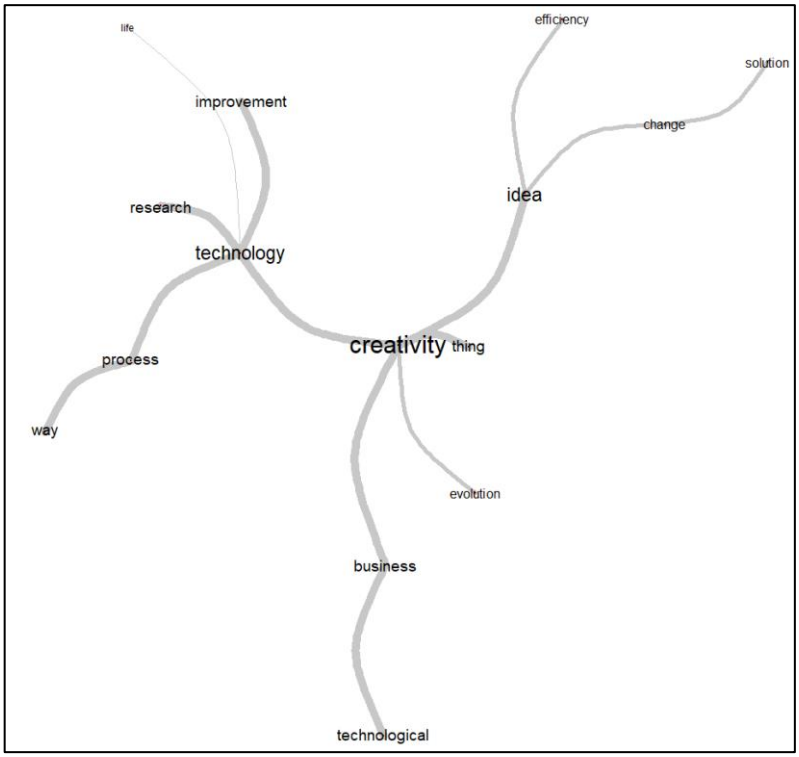
Figure 4. Similarity Analysis for Q2 (Students, Professionals and Teachers)



(i)



(ii)



(iii)

(i) Students, (ii) Professionals and (iii) Teachers.

The similarity analysis reinforces the results presented in the word cloud analyses and highlights the terms **creativity** and **technology** as central elements related to Innovation, regardless of the respondent group. The same analyses were performed for responses grouped by country (Bolivia, Brazil, India, and Mexico) and gender (female and male) and no significant differences were observed.

Unlike the first question (Q1), which aimed to understand what Innovation is, the second question (Q2) sought to understand what Innovation is related to. Therefore, we observe that in the view of the study participants, Innovation is 'the **improvement of processes, things and products** or the **creation of new ideas, new products, new things** or **new processes**' and is related to **creativity** and **technology**. According Cropley (2006), the creativity is a driving force of innovation.

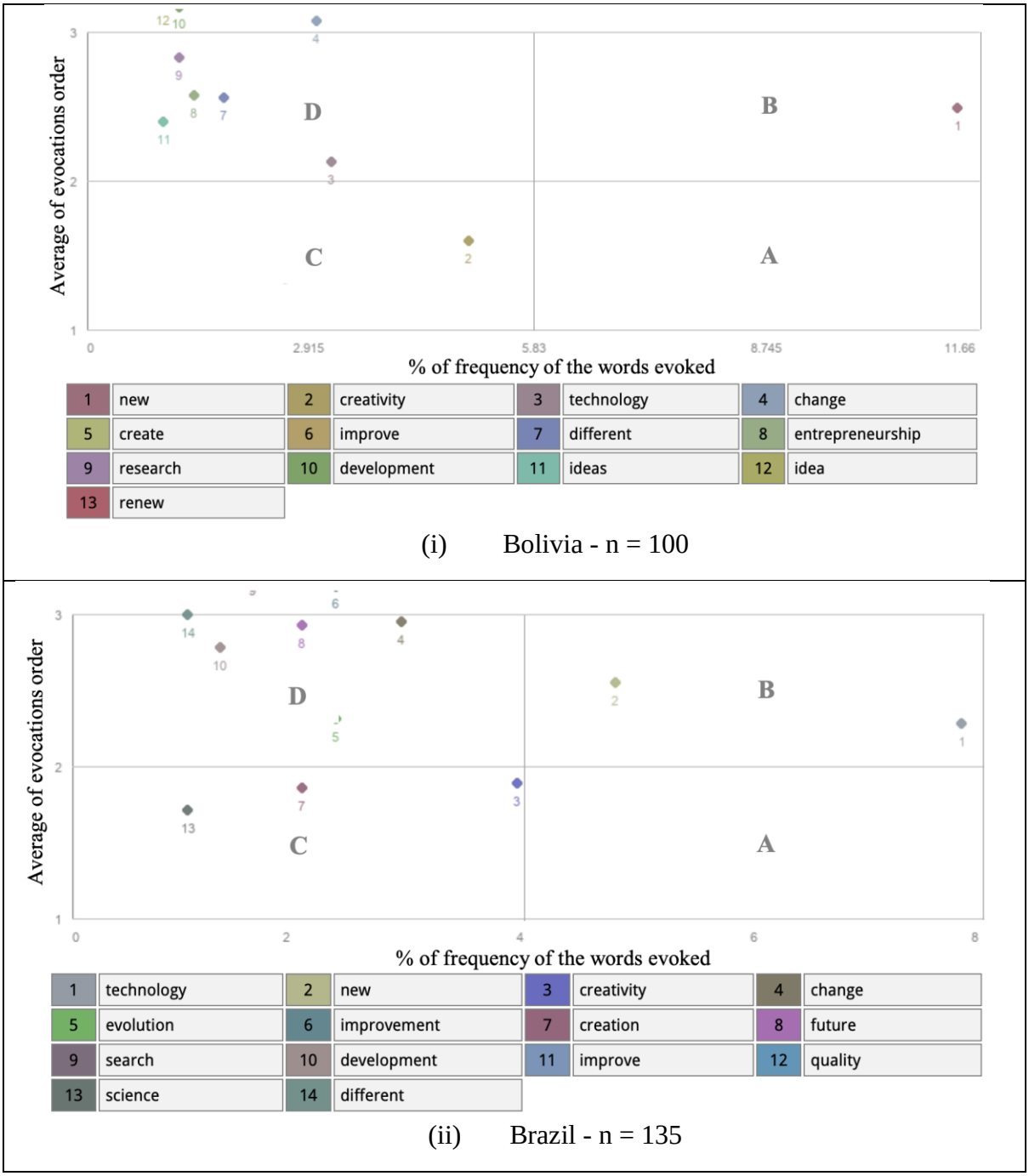
Our results are at odds with the results found by Nager et al. (2016). Although there was a small predominance of male students (total 150) associated with STEM fields, the number of female students (139) was quite close. Furthermore, we observed no differences in the perception of the concept of innovation between female and male genders. Nager et al. (2016) also suggest that the higher the level of education, the higher is the understanding for innovation. However, we did not identify significant differences in perceptions of the concept of innovation between the groups of students, professionals, and teachers. There is a considerable difference in the educational level of our sample. The professors group, although a smaller number in the sample (67), is mostly composed of PhDs (97% of the sample). Our conclusions are better substantiated in the subsequent analyses.

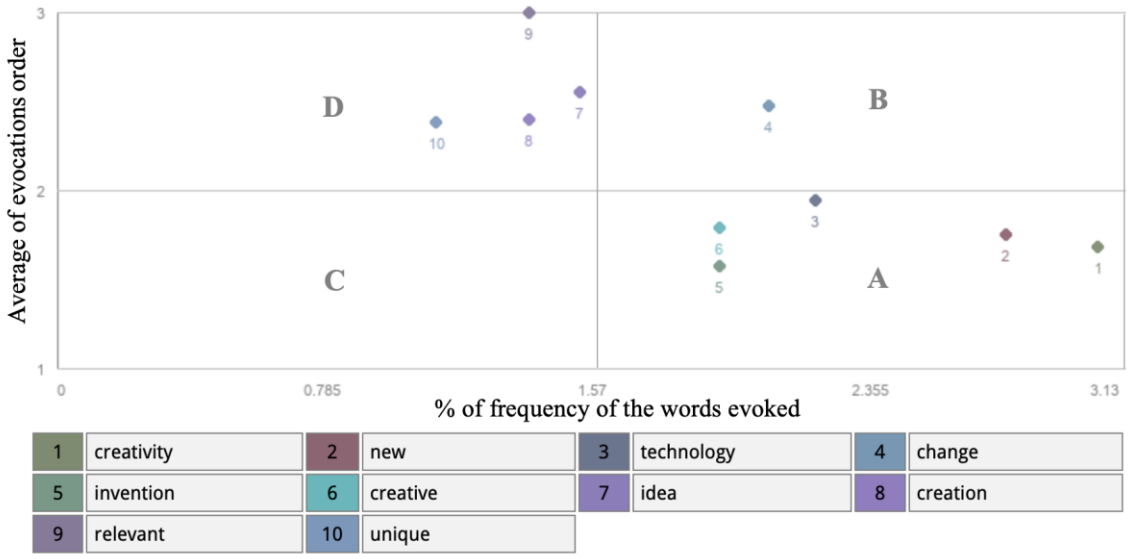
3.3 Social Representation of the concept of Innovation

To identify the social representation of the concept of Innovation, it was used the four-house quadrant technique suggested by Vergès (2003). As shown in Table 4, the samples grouped by respondent position (student - 289, professional - 194 and teacher - 67) show a considerable discrepancy in terms of size (Wachelke et al., 2016), which could compromise the analysis via a four-house quadrant (Vergès, 2003). Thus, we chose to analyze the samples grouped by the respondent's country of residence (Bolivia - 100, Brazil - 135, India - 141 and

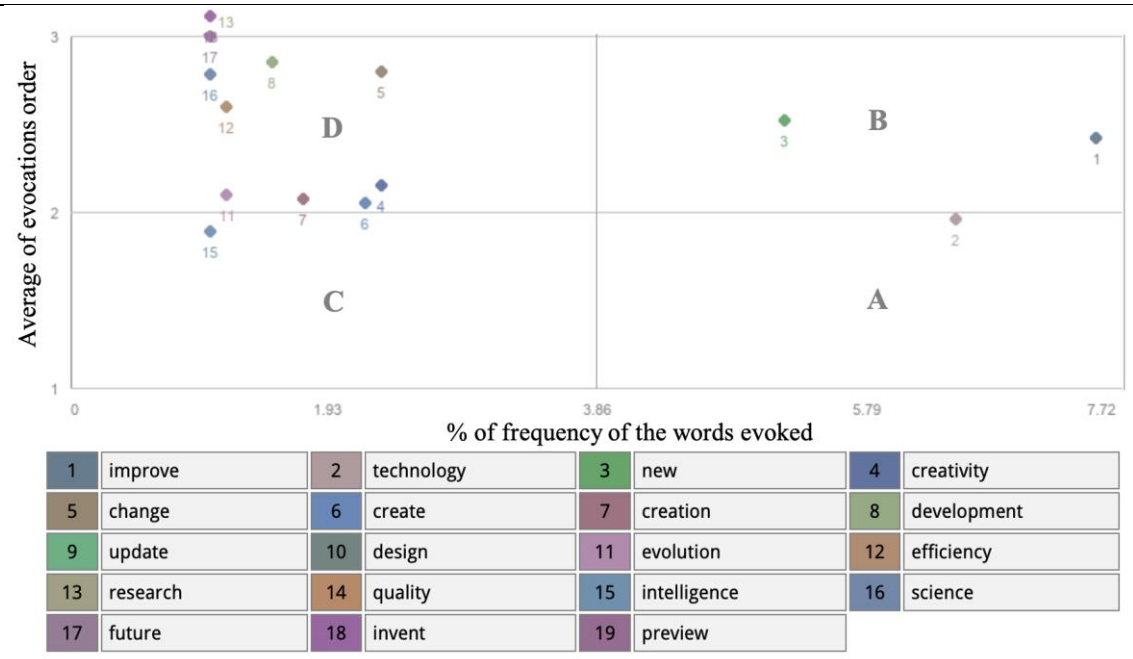
Mexico - 174). Next, in Figure 5, we present the analysis via four-house quadrant by country of residence of the survey participant.

Figure 5. Social Representation Analysis via Verges' (2003) four-house quadrant





(iii) India - n = 141



(iv) Mexico - n = 174

The participants from Bolivia did not present any word that could be associated with the central core quadrant (A) of the social representation. The word '**new**' had a mean frequency percentage of 11.6 (57 evocations) and a mean in the order of evocation of 2.49, being allocated in the peripheral system (B). The word '**creativity'** had a mean frequency percentage of 5.11 and a mean in the order of evocation of 1.6. The word '**creativity'**, although rarely evoked, when mentioned was in the first positions, being in the C quadrant. All the other words mentioned by the Bolivians and with relevant percentages of evocation were placed in quadrant D.

The Brazilians presented a result close to the Bolivians in not being able to associate a word with the central nucleus (quadrant A), although the word '**creativity'** had a low average evocation order (1.89) and evocation frequency equal to 27 (4%). The word '**technology'** had a frequency of 54 evocations (8%) and average in evocation order of 2.28. Both words are associated with peripheral systems of social representation, with emphasis on the term '**technology'** which was associated with the peripheral system B.

The Indians presented quite different results from the Bolivians and Brazilians. A total of four words were associated with the central core of the social representation of the concept of innovation. The term '**creativity'**

had a frequency of 22 evocations (3.13%) and an average in the order of evocation of 1.68 (there were no evocations in positions four or five). The words '**new**' (20 - 2.85% - average 1.25), '**technology**' (16 - 2.28% and 1.94), '**invention'** (14 - 1.99% and 1.57), and '**creative'** (14 - 1.99% and 1.79) were also classified as part of the Indian core. The core social representation of the concept of Innovation for Indians is more in line with the observations of Bhasin (2012) and Cropley (2006) than Bolivians and Brazilians.

The Mexicans followed a similar response trend as the Bolivians and Brazilians, but one word stood out as belonging to the central core of the social representation. The word '**technology'** stood out with a frequency of 57 evocations (6.67%) and a mean evocation order of 1.96. The words '**improve'** (66 - 7.72% and 2.42) and '**new**' (46 - 5.38% and 2.52) composed the peripheral system of the social representation of the concept of innovation in the view of Mexicans.

Our analyses suggest that the Bolivians, Brazilians, and Mexicans observe the concept of innovation still as an abstract object that does not materialize in their daily lives (objectification), preventing a concrete composition of its central core (anchoring). Moscovici (2001) suggests that objectification is associated with the cultural and historical context of the individual and their group experiences. Thus, we observe the context of the individuals participating in this research on a macro and micro level.

The Latin American countries observed in this study are ranked in the Global Innovation Index 2020 (Dutta et al., 2020) at positions 55 (Mexico), 62 (Brazil), and 105 (Bolivia). India is ranked at position 48. These data suggest that the countries involved in the study do not have an innovation-oriented culture at the national level, but innovation may be part of some groups, especially in academia.

Hereupon, the authors seek to understand the context in which the research was carried out and the historical background of the respondents. The participants from Latin American countries had some kind of link with the universities to which the researchers in this study belong. The universities in Bolivia, Brazil and Mexico are private institutions with a still developing innovation-oriented culture. There are few or no patents registered by these universities and partnerships for research projects with innovative purposes are incipient. Otherwise, the respondents from India are alumni (professionals), students or professors from a private university, located in the north of the country and ranked first in the country in the number of patent deposits (more than 900 patents registered according to the institution's website).

We believe that cultural aspects that have developed in the academic context in which the research participants are or were inserted have contributed to the formation of a central core of the social representation of the concept of innovation. Vergara e Ferreira (2005) consider that the central core develops within a historical and cultural context that are decisive for the representation of an object by the group. The anchoring of TSR is associated with the personal characteristic of the individual, his cultural/historical context, and the personal experiences of each individual (Jodelet, 2001; Moscovici, 2001).

Our observations suggest that the way individuals observe the concept of Innovation is closely associated with the cultural context in which this individual develops their perceptions. Stock, Six and Zacharias (2013) conceptualize innovation-oriented culture as a set of cultural organizational values, norms, and artifacts that support a company's ability to innovate.

Furthermore, our findings are in line with Tian et al. (2018) who noted in the literature how culture influences innovation. Tian et al. (2018) suggest that an innovation-oriented culture can be a key resource for organizational innovation and is conducive to a firm's growth and performance. Organizations that seek in innovation a sustainable competitive advantage at an internal (exploitation) or external (exploration) level - ambidexterity (March, 1991; O'Reilly & Tushman, 2008; Tushman & O'Reilly, 1996) may find in the individual's perception of innovation a source of resistance or of flexibility and adaptation to new organizational practices (Bonesso, Gerli, & Scapolan, 2014; Schnellbächer, Heidenreich, & Wald, 2019). Thus, the development of an innovation-oriented culture in the organization can be an antecedent of ambidextrous practices at the contextual level (Chen, 2017; Tushman & O'Reilly, 1996).

Dyer et al. (2004) suggest that innovation in a classroom and training environment is greatly impacted by the teachers' values and belief systems. However, based on our results, we believe that the beliefs and values that teachers impart to their students must be previously developed by the environment in which teachers and students are involved - an innovation-oriented academic environment can influence an individual's belief and value

system. Returning to the initial framework of influencers factors of innovation concept (Figure 1), the authors believe that cultural parameters, not at the global or national level, but at the organizational or group level may have the greatest influence on an individual's perception of innovation concept. Study results suggests that the perception of the concept of innovation does not develop due to macro factors (e.g. countries, language, location, age or gender) or even according to the individual's position in society (students, professionals or teachers). The concept of innovation develops within the micro context in which the individual is inserted. In this scenario, universities can be an initial environment for the development of an innovation-oriented culture that can spread to the organizations where students will be inserted in their professional careers.

CONCLUSION

At this point it is appropriate to return to the questions that guided this study: Can the meaning of Innovation be varied and depend on idiographic cultural aspects such as country, age, gender, language or social position (e.g., student, teacher or professional)? or (ii) Is the meaning of innovation independent of idiographic cultural aspects, but dependent on the individual's context?

The results of the study suggest that idiographic cultural aspects associated with the individual's country, age, gender, language, or social position do not influence their perception of what the concept of innovation is. Organizational and group contexts seem to be more relevant for the individual to establish their core social representation of the concept of innovation. The authors observed no differences in the perception of the concept of innovation between female and male genders. Furthermore, there were not identify significant differences in perceptions of the concept of innovation between the groups of students, professionals, and teachers.

For the three groups analyzed (students, professionals, and teachers), Innovation is the improvement of processes, things and products or the creation of new ideas, new products, new things or new processes. It was identified in the analyses that there is some confusion in the answers between the concept of invention and innovation. Also, analyses suggest that the Bolivians, Brazilians, and Mexicans observe the concept of innovation still as an abstract object that does not materialize in their daily lives. Cultural aspects that have developed in the academic context in which the research participants are or were inserted have contributed to the formation of a central core of the social representation of the innovation concept.

The element that proved to be the main influencer for the formation of the central core of the social representation of innovation concept of the individuals analyzed was the academic environment in which each group was associated. The considerable cultural difference in terms of innovation practices between the educational institution in India and the educational institutions in Brazil, Bolivia, and Mexico proved to be a relevant factor when comparing the data from the four countries.

The authors believe that the results of the study have implications for academia and organizations. In academia, the study demonstrated alignment with previous work (Aichouni et al., 2015; DeCusatis, 2008; Tian et al., 2018), but highlighted one element that may have superior influences on the formation of the concept of innovation at the individual level (the innovation-oriented university academic environment). Otherwise, further studies are needed to confirm the influence of an innovation-oriented academic environment on the formation of the central core of individuals' social representation.

For organizations, the results of this study have relevance by suggesting that a highly innovation-oriented environment may have considerable influence on the formation of the concept of innovation by individuals in that environment. It is believed that this type of observation can aid studies in the field of organizational strategy, particularly those studies that discuss the micro-foundations of ambidexterity in organizations (e.g., Junni, Sarala, Tarba, Liu, & Cooper, 2006).

Even though the methodological and theoretical aspects required by a scientific study are applied, limitations must be considered. The study took place in groups of professionals, students, and professors linked to a single educational institution each located in one of the countries involved in the research. The location of the educational institutions in the country may be influenced by the region in which it is located. For example, the Indian institution is located in the north of the country, which is considered a wealthy region and a technological

center. Otherwise, Brazil is a country of continental dimensions and susceptible to considerable discrepancies in its academic environments depending on the location of the institution. A similar analysis can be performed for Bolivia and Mexico which, despite a smaller territorial extension when compared to India and Brazil, have regional differences associated with wealth and concentration of educational institutions with innovation practices. As observed in the results of the study, the environment is an influential factor in the composition individual`s central core and should be considered as an influential variable in studies of this nature. Perhaps, studies with a greater diversification of participants and educational institutions may present results that validate, or not, the evidence presented in this paper.

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