

# Analyzing Blended Learning in Brazil from Actor-Network Theory: A qualitative Study

Alan César Belo Angeluci<sup>1,\*</sup>, Marcello Cacavallo<sup>2</sup>

<sup>1</sup>Master Program in Communication and Education, Municipal University of São Caetano do Sul, São Caetano do Sul, Brazil

<sup>2</sup>Master Program in Communication, Municipal University of São Caetano do Sul, São Caetano do Sul, Brazil

\*Corresponding author: [aangeluci@uscs.edu.br](mailto:aangeluci@uscs.edu.br)

**Abstract** This paper presents a qualitative study in which data collected indicate the main text codes related to innovative blended learning practices from interviews carried out with specialists on this field in Brazil. The main purpose of the study was to identify and analyze codes that highlight the tensions between human and nonhuman actors present in innovative practices of blended learning. Supported by Atlas.ti® software, the found terms were associated and analyzed from recurring concepts in Actor-Network Theory, formulated by Bruno Latour. The French scholar postulated that several actors, human and nonhuman, interconnected and dependent on each other, form a hybrid world. It is important to better understand the roles of man and machine, escaping from the common sense speech that they are more or less important than the other when it comes to discuss innovations on blended learning. The study object reveals itself therefore as fertile ground for reflection on the tensions between these two instances.

**Keywords:** actor-network theory, blended learning, qualitative study

**Cite This Article:** Alan César Belo Angeluci, and Marcello Cacavallo, "Analyzing Blended Learning in Brazil from Actor-Network Theory: A qualitative Study." *American Journal of Educational Research*, vol. 4, no. 9 (2016): 669-673. doi: 10.12691/education-4-9-4.

## 1. Introduction

The role of communication mediated by digital technologies is of utmost importance for educational models. In the last two decades, the Information and Communication Technologies (ICT) allowed both the educational institutions and students to promote significant changes in teaching and learning process. Mediation by technology not only occurs in distance education courses entirely online, but also is present within the traditional schools in various ways, from the use of computer labs for learning support and inside the classroom for specific activities to the application of one or some subjects completely virtually.

Educational practices must also evolve. There is debate today if the traditional education models (presential) would be already overcome or if the distance education would be unsatisfactory. New trends are emerging, among them the mixture of the two models: hybrid or blended learning. When it comes to discuss this issue, it is very usual to fall into discourses putting man and machine into conflict, as they were part of opposed faces.

In contemporary society, the use of ICT is embedded in everyday life through various electronic and digital equipment that allow the access to convergent media. This perspective brings changes in habits and creates a hybrid world formed by several actors, human and nonhuman, interconnected and dependent on each other in terms of Latour and his Actor-Network Theory (ANT). In the following pages, we present a study based on a qualitative

survey of codes most often cited when discussing innovations in blended learning in the Brazilian context.

The main purpose of the study was to identify and analyze codes that highlight the tensions between human and nonhuman present in innovative practices of blended learning using ANT. These words were systematically associated with nine key concepts addressed in the ANT and analyzed in the light of them. The goal was to provide an analytical perspective on blended learning that put human and nonhuman actors in a collaborative and interdependence relationship, not establishing superiority or inferiority of relations between man and machine.

## 2. The Perspective of Actor-Network Theory

Begun in the 1980s by studies in the areas of Science and Technology, ANT consists to maintain within the same analysis human and non-human elements. ANT supports the idea that human beings establish social networks not only because they interact with each other, but also with non-human materials. In Melo's [1] words, "the composition of what we call social is due not just to people, but also the machine, animals, texts, money, architecture, laboratories, institutions [...]".

According to Latour [2], ANT claims a social hybrid composition, understood as a socio-technical collective of human and non-human entities. To Lemos [3], mediators are not human in the culture environment. These objects induce individuals to take actions that cause changes in

the behavior, but these non-humans are also modified according to our needs. The author adds that currently the communication between human and nonhuman is even more intense: "increasingly nonhuman, now smart-connected and sensible communicative devices make us do things, change our way of thinking and acting in all the domains of culture" [3].

ANT was developed through the writings of researchers Bruno Latour, Michael Callon and John Law and updated by Latour in 2005, when the book "Reassembling the Social: an Introduction to Actor-Network-Theory" was published [4]. For Passarelli [5], "Latour seeks to break with the subject-object division to think about the crisis of action of individuals in the nature, and focus his analytical insights in the discursive effects of modernity, which creates pure and hybrid types according to him". When "trying to place science and technology production, the eternal relationship between society and nature", Latour proposes an added dimension to the nonhuman subject. He proposes a stabilization in which nature and society transit and coproduce collectively [6]. It follows, therefore, that the subject (human) and the media (nonhuman) establish a relationship with a world in which, in contemporary culture, mediations occur by digital artifacts. A world populated by hybrids created by continuous mediations through each other, human and nonhuman [3].

## 2.1. ANT key Concepts

In ANT, terms and concepts act as an auxiliary tool in understanding the theoretical framework. The main and the ones used in this study are: actants, translation/mediation, registration, symmetry principle, controversy, black box, space and time. The terms are widely exploited in [2,3]:

- Actant: is a term borrowed from semiotics and means everything that generates an action, which produces motion and difference, and can be human or nonhuman. It is the mediator. According to this concept, the human is not in evidence, as the nonhuman has the same importance. What matter is the action and who acts, the actant;
- Translation/mediation: term linked to the communication and the transformation of actants, as well the establishment of networks. The relationships always imply in changes. The delegation is part of a mediation. It is about the passage of one's actant responsibilities to another;
- Registration: form of translation in which the association is defined from the composition in different devices (machines, graphs, maps, etc.). It is the hybrid composition of any production;
- Symmetry principle: the principle of giving the same importance to the actants, humans or nonhumans – both are at the same level;
- Network: is the space-time itself, and here we have the key concept of associations. Network is not where things go through, but what is formed in the relationship (mediation or translation) of things;
- Controversy: it is the place and time where associations are elaborated. It is where the questions, conflicts and social problems are created;
- Black box: the stabilization and resolution of controversies and problems initiated through mediation or translation;

- Space and time: what is produced from the mediation between human or nonhuman objects. It is the combination of things and places.

Just to highlight some of them, Bruno [4] says ANT refers to the heterogeneity of existence modes, which forms the social. Being actants are defined by the way they act, the action is usually towards a transformation and changing. This is the reason the translation and mediation concepts are so fundamental for the theory.

Note that any item that produces a transformation in the course of a situation should be classified as an actant, which participates in a collective mode. This collective is what can be described as the network [4].

Another concept that should be emphasized is the controversy. Disputes and negotiations are common between actants in a network. Through translation and mediation, this controversy continually redefines the actions, actors and their associations, as well as the network itself. "The networks do not exist as an object that was there before the action, or what remain after cease the actions" [4].

This explains the meaning of Actor-Network expression. Inside a network, an action is never individual: if an actant acts, this is because it was driven or influenced by another actant's action or existence. When one moves the other, the latter one goes into action. Considering Lemos's [3] words, "the actor-network is transient and only persists while the associations persist between the various mobilized actants. The action is what should be analyzed by their tracks in a particular association".

ANT provides a fruitful theoretical ground to analyze how educational practices in blended learning are being conducted. As once said Melo [1], each individual has their learning processes linked to a network that supports him/her, and that are originated in the associations between human and nonhuman actants.

## 3. A Deeper Look into Blended Learning through ANT

The idea of hybrid teaching and learning is revealed as an important space for exploration of ANT terms and concepts. Moran [7] explains that being blended meaning mixed, merged and hybrid, it is worth pointing out that education has always been mixed, hybrid, combining time, space, activities, methodologies and audiences. With the advent of connectivity and, more recently, mobility, blended learning is much more noticeable, broad and deep. The hybrid in education sets, therefore, as a breeding ground for analysis of the relationship between human and nonhuman in a contemporary context of profound changes.

Valente [8] explains that the blended learning follows a trend of change and innovation that is taking place in almost all services and in the production of goods, which incorporates features of digital technologies, such as the computerization of banking, market and industry. The changes that have occurred caused shifting the focus of the activities from the agents who provided those services to the users – or, from ANT perspective, to human actors. In this context, the author states that the blended learning has to be understood not as a new fad on education field, but a paradigm that is being definitely established.

Bacich, Tanzi Neto and Trevisani [9] stresses the importance of the use of digital technologies in school, enabling the personalization of education. In this sense, it is possible to assume nonhuman actors are fundamental for the processes of translation and mediation towards the black box. According to the authors, blended learning has to be understood as an idea of education that takes place in different ways and in different places, not having any single way to learn, and being learning a continuous process. So blended learning can be seen as a constant relation between actors in a network, interacting in a space-time full of controversies towards the black box, in a constant process of translation, mediation and registration.

In general, blended learning deals with the convergence of educational models: the face-to-face one, where the process takes place in the classroom, in the traditional form; and the online model, which uses digital technology to promote distance education. It is considered that these two learning environments, the traditional classroom and the virtual space, become gradually complementary. The authors [9] explain that "[...] this is because, in addition to using various digital technologies, the individual interacts with the group, intensifying the exchange of experiences that takes place in a physical environment, the school." So the tensions between human and nonhuman actants within these space-time networks models require special attention from ANT perspective.

#### 4. Qualitative Study: Materials and Methods

In order to identify and analyze codes that highlight the tensions between human and nonhuman present in innovative practices of blended learning, a qualitative study was carried out. Data were collected from a sample of five semi-structured interviews with representatives of prominent Brazilian institutions currently researching and applying blended learning with highlighting and national recognition.

The content analysis (CA), referred to the Bardin [10] methodology was used as method framework for classification, coding and categorization of information collected. For pointing the similarities, rankings and frequency patterns of codes in primary documents, a licensed version of Atlas.ti® software was used.

The general process consisted in: (1) conducting nine interviews with researchers and professionals involved in the practice of blended learning in Brazil through a semi-structured questionnaire script based in seven general themes: education, communication, time, action, innovation, space and network. Four interviews were not considered for analysis due to the repetition of arguments, information and speech, and less relevant contributions for the scope proposed. Although the interviewees from institutions were chosen based on their prominence and national recognition and gave written authorization to publicize their profiles, they authors opted to hide their names in this publication; (2) pre-analyzing the transcribed interviews through an statistical frequency of words occurrence, identifying the 30 text codes most frequently mentioned in interviews; (3) coding, relating the words and the seven codes extracted from questionnaire script; and (4) categorizing the codes

following the ANT selected terms, building a matrix to make inferences between ANT terms and content extracted from interviews.

#### 5. Data Analysis and Interpretation of Results

The five interviews considered conducted with researchers and professionals involved in the practice of blended learning in Brazil were recorded and transcribed in five primary documents (PD), identified from P1 to P5. A pre-analysis of the transcribed documents was conducted, seeking the cleaning and preparation of the material collected. They were all read and typing, spelling errors and colloquialisms were revised.

Following, each PD was applied in Atlas.ti software for data processing. It was conducted the analysis of the statistical frequency of codes' occurrence. Bardin [10] explains that one of the practices to make a study of a text code is to identify "the total number of words or present events".

The statistical frequency of occurrence was made by Atlas.ti functionality known as "Word Cruncher". As a result of this initial exploration, Atlas.ti system generated an information matrix in Excel spreadsheet format, and identified 19,549 words in 12,295 cells. Disregarding repetitions, the system identified 2,549 words, resulting from a unification of the PDs. The result of this first analysis, according to Bardin [10], brings a syntactic classification of words, which can be differentiated in text codes and instrument-words. The text codes are words carriers of meaning and are classified into nouns, adjectives and verbs. The instrument-words are functional words for connection, such as articles, prepositions, pronouns, adverbs, conjunctions etc. Due to the number of words found, it was opted for the delimitation of the data analysis considering the 30 text codes with higher frequency. The instrument-words were excluded from this analysis.

This construction of text codes is clearly seen through the creation of word cloud, being able to see the importance of each word in a text corpus created by the content shown in Table 1.

According to Camargo and Justo [11], "the word cloud groups and organizes graphically depending on their frequency. It is a simple lexical analysis but graphically very interesting". The word cloud (Figure 1) was created through the site WordClouds.com.



Figure 1. Word cloud created by the frequency of full-words most frequently mentioned in interviews

For the categorization, coding was built from the topics covered in the interview script. Bardin [10] explains that although a word does not have a precise position in linguistics, linguistic accuracy can be raised, if applicable. In this sense, text codes can be related to the theme words. The theme topics were chosen based on semi-structured questions script formulated for interviews. They are education, communication, time, action, innovation, space and network.

Among the thirty text codes most frequently mentioned, the words "teaching", "professor", "class", "student", "classroom", "course", "learning" and "education" were coded with the theme "Education". The words "technology", "communication", "discussion", "platform" and "content" were coded with the theme "Communication". The words "do", "have", "give," "use," "say", "work", "paper" and "understanding", were considered in the "Action" theme. The words "hybrid" and "innovation", were encoded in the "Innovation" theme. The theme "Time" reunited the code words "today," "presential" and "time". "Group" and "people" were coded

with the theme "Network" and, lastly, the word "distance" was encoded with "Space" theme. It is noteworthy that this encoding process is based on criteria such as the interviews content and script and the literature related works.

Following the data analysis, the next step was the categorization of themes and text codes according to ANT. For the creation of the categories, ANT terms and concepts explored in the previous lines were used. Through the interpretation of the text codes, an interface between the coding and the categorization of ANT terms was created using a matrix table (Table 1). Some coding have been classified into more than one category, according to the interpretation of the text codes. An important point was the analysis of coding and each text in order to relate them to the characteristics of ANT terms and concepts. Through coding, the text codes were consolidated in accordance with ANT, creating a relation between text codes, coding and categorization, as shown in Table 1.

**Table 1. Interface between data collected and ANT**

ANT terms	Definitions of Terms	Coding	Text codes identified
Actant	Who generates action (human and nonhuman)	Education, network communication	Teacher, student, technology, group, people
Translation / Mediation	Linked to communication, transformation of actants	Communication, innovation, action	Communication, innovation, do, have, give, use, say, work, paper, understand
Registration	Hybrid production	Innovation	Hybrid
Symmetry principle	Equality between individuals and objects	Communication	Technology
Network	Which is formed in the connection and interaction	Education	Class, course, graduation
Controversy	Place and time where associations are elaborated	Education, time, space, education	Classroom, today, presential, distance, time, platform
Black box	Stabilization and resolution of disputes, social problems	Education, action	Learning, understanding
Space	Production of mediation between the actants (human and nonhuman)	Education	Teaching, education
Time	Production of relations between things	Education, communication	Teaching, class, course, learning, education, discussion, say, graduation, content

### 5.1. Inferences and Discussions

The tensions between human and nonhuman actors present in innovative practices of blended learning emerge when inferring and relating the matrix with interview excerpts. The teacher was the highest recorded actant in the analysis of the textual corpus. Considering the responses, in blended learning activities, the teacher have to seek professional training to deal better with technology devices. In this case, nonhuman actors interact with human actors towards an action.

"Communication" was the most prominent word as "translation" and "mediation". As said by one interviewed, "it is not possible to talk about education and communication as distinct things. (...) Communication is fundamental for a teacher". In order to promote the act and transformation in education, interviewers said actors should always be in movement, constantly updating, changing and innovating processes through interaction and intensive communication with students, colleagues, new software and trends.

The analysis of the interviews also revealed that the word "hybrid" is directly associated with the term "registration". Hybrid was perceived in the reports as an

innovation due to the mix of various forms of media use in the application of blended learning - such as reading, videos, games and other elements from the media universe. No wonder the discussions of media and information literacies are so emerging as today. The interviewees saw the hybrid as a mixture, a process of creating and processing necessary innovation for teaching-learning practices: "I use several spaces and work with reading, video, games and an entire universe focused in a learning environment", said one interviewed.

Symmetry is the establishment of similarity and correspondence between human and nonhuman actants. The answers indicated that, although teachers are still reluctant about technologies, it is unlikely to practice the blended learning without teaching in integration with technology – as postulated by ANT symmetry principle concept. This integration tends to promote innovation in teaching and learning.

"Class" is text code linked to "Network". Network stands as the production space in a relationship with time. Creating new class formats is perceived as an important matter for the respondents listened. According to one interviewed, "there is a great difference when a teacher has a pedagogical concept behind the use of a technology;

(...) focusing in the personalization of teaching process, there is a big difference in the use result". The practices of classroom lessons mixed with virtual classes, as well as the content for this type of format, were mentioned as a big challenge.

Innovation was also registered linked with "learning" and the term "Black Box". Professionals are concerned with creating more innovative learning opportunities to students by using technologies. "Space" and "Time" were ANT terms identified with teaching as a format of production. The reports highlighted again, in this relation, the power that technology has to offer to create differentiated and innovative paths: "people learning in different time and manners; so solutions have to be found for these distinct profiles", said one interviewed.

## 6. Final Considerations

The Actor-Network Theory seeks to show that human and non-human actors are all actants of a network in which relationships are built from interactions that generate, in principle, disputes between participants within black boxes, in which, when opened, pacify the actants.

The main purpose of this study was to identify and analyze codes that highlight the tensions between human and nonhuman actors present in innovative practices of blended learning. The reflection presented here is a picture that can serve as a starting point in the formulation of similar work to be related to ANT when analyzing hybrid models of teaching-learning processes. Finally, it can also collaborate in the development of public and private policies at the interface between education, communication and technology.

## References

- [1] MELO, M. F. A. Q. *Discutindo a aprendizagem sob a perspectiva da teoria ator-rede*. Educar em revista, Curitiba, n. 39, jan-abr 2011.
- [2] LATOUR, B. *Reagregando o social: uma introdução à teoria do ator rede*. 1a. ed. Salvador - Bauru: Universidade do Sagrado Coração, 2012.
- [3] LEMOS, A. *A comunicação das coisas - teoria ator rede*. 1a. ed. São Paulo: Annablume, 2013.
- [4] BRUNO, F. *Rastros Digitais: o que eles se tornam quando vistos sob a perspectiva da teoria ator-rede?*. XXI Encontro da Compós. Juiz de Fora: Compós. 2012.
- [5] PASSARELLI, B. *Literacias emergentes nas redes sociais: estado da arte e da pesquisa qualitativa no observatório da cultura digital*. In: PASSARELLI, B.; AZEVEDO, J. Atores em rede: olhares luso-brasileiros. 1a. ed. São Paulo: SENAC, 2010.
- [6] CAVALCANTE, M. T. L.; VASCONCELLOS, M. M. *Tecnologias de informação para a educação na saúde: duas revisões e uma proposta*. Ciência & Saúde Coletiva, Rio de Janeiro, v. 12, n. 3, 2007.
- [7] MORAN, J. M. *Educação híbrida*. In: BACICH, L.; TANZI NETO, A.; TREVISANI, F. D. M. Ensino híbrido: personalização e tecnologia na educação. 1a. ed. Porto Alegre: Penso, 2015.
- [8] VALENTE, J. A. *O ensino híbrido veio para ficar*. In: BACICH, L.; TANZI NETO, A.; TREVISANI, F. D. M. Ensino Híbrido: personalização e tecnologia na educação. 1a. ed. Porto Alegre: Penso, 2015.
- [9] BACICH, L.; TANZI NETO, A.; TREVISANI, F. M. *Ensino híbrido: personalização e tecnologia na educação*. In: BACICH, L.; TANZI NETO, A.; TREVISANI, F. D. M. Ensino híbrido: personalização e tecnologia na educação. 1a. ed. Porto Alegre: Penso, 2015.
- [10] BARDIN, L. *Análise de Conteúdo*. 3a. ed. Lisboa, Portugal: Edições 70, 2004.
- [11] CAMARGO, B. V.; JUSTO, A. M. *IRAMUTEQ: um software gratuito para análise de dados textuais*. Pepic Periódicos Eletrônicos em Psicologia, Ribeirão Preto, v. 21, n. 2a, dez 2013.