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Agency and signification in learning with digital technologies: a theoretical approximation of actor-network theory and representational perspectives

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Abstract

This paper put an approximation of Actor-Network Theory – ANT (cf. Callon & Latour, 1981; Latour, 1988; Latour, 1993; Latour, 1994) and representational philosophies deriving from the social semiotic multimodal theories (e.g., Hodge & Kress, 1988; Kress, 2010; Kress & van Leeuwen, 2021; van Leeuwen, 2005) to the fore to conceptualize how meaning-making (known as sign-making, learning, the process of signification, Bateman, 2018; Bezemer & Kress, 2016; Kress, 2010) via technologies come about from the technologies' various prompts. It is essential to recognize how representations such as semiotic resources – here, technologies and sign systems – have agency to form social practices. They are agentively selected, interpreted, and acted upon by the user into meaning-making activities (Jewitt, 2008, 2009, 2014). The technologies' front- and back-end properties' semiotic regimes (van Leeuwen, 2005; Djonov & van Leeuwen, 2018a) in different configurations ~~can~~ function as actants by symmetrically translating interests between humans and non-humans, into hybrid existences (Callon & Latour, 1981; Latour, 1994). Humans and technical objects are not rigid and independent substances (Platonic) but beings in constant (re)associations, which modify their existence (Callon & Latour, 1981; Latour, 1994). In that sense, Callon and Latour's claims can be understood in line with the genesis and development of representations that, from a historical epistemological perspective (Wartofsky, 1979), are in constant (re)associations by technologies, cultures, social practices, and humans. As humans mediate by means of their representations (Wartofksy, 1979), the representations are re-shaping and re-shaped through the history of reproduction that impacts interaction, meditation, and meaning-making (Kress, 2010; van Leeuwen, 2005; Wartofsky, 1979). The purpose of this paper is to briefly sketch a future research aspiration striving to theoretically approximate the ANT and representational philosophies and examine what kind of agency digital technologies impose on the users and how the users draw upon that imposition in their meaning-making. Crucially, such a reflection can heighten current understandings of the intricate relationships and networks created by humans and digital technologies in contemporary learning settings such as school to better appreciate students' digital learning from a representational agency perspective integrating the "signifieds-in-transformation" and "actants." In preparation for future research studies, the following research question guides the theoretical explorations: who acts in the process of signification in learning activities with digital technologies?

Keywords

Technologies, sign systems, semiotic resources, actant, signifieds, learning, education

The Technical Agency and The Signified

Prescribing subjectivity only to humans and objectivity only to non-humans (nature and artifacts) is, according to Latour (1993), part of a modern perception of the world. One consequence of this anthropocentric perception, which makes social actions of techniques invisible, is to deceptively reduce educational learning with digital technologies to didactic activities with neutral tools obedient to human interests. Modern opinions are about the illusion that humans have control over the world, misleadingly justified in the rational exclusivity of human

existence. This illusion – the confusion of rational-human exclusivity with humanity as the only agent in the world – prevents an understanding of social existence as a hybrid translator of interests between humans and non-humans. From an ANT perspective, humans are beings whose existence takes place through the conciliation of interests with non-humans. Conciliations that are not always conscious where unconscious behaviors can reduce critical understandings of social existence.

In technical mediation, Latour (1994) emphasizes that since "the word agent in the case of non-humans is uncommon, a better term is actant, a borrowing from semiotics that describes any entity that acts in a plot until the attribution of a figurative or non-figurative role" (Latour, 1994, p. 33). In a semiotic review, Latour's (1994) interest is not to attribute human qualities to technical objects but to break the polarization between human-subjects and non-human-objects, considering that the object assumes the role of the subject when it places its interests and acts in technological mediation by translating, composing, black-boxing, and delegating. Thus, an actant puts interests and negotiates wills, interfering in social actions and determining users' ways of acting, thinking, and feeling. These actants can be approximated with the signifieds that act as prompts from a social semiotic viewpoint. Prompts produce affect and trigger various processes of signification, where meaning is anew turned into a signified emerging different meaning-making outcomes (Bateman, 2018; Kress, 2010). Examples of technological and human signifieds are the design and processes manufactured into digital technologies (Djonov & van Leeuwen, 2018b) or the modalities produced by the user in interaction (Kress, 2017). The signifieds are then constantly acting in and transformed by the re-signification processes, where humans' cognitive processes of actions and sign-making and non-human activation of representations are salient and intertwined components (Bezemer & Kress, 2016; Wartofksy, 1979). Thus, in this short paper, the representational agency is about the active process of translations and re(associations) between humans and non-humans, which compose actor-networks existences. The approximation of the ANT and representational approaches are conceptually launched in preparation for future research studies that intend to contribute to a greater understanding of how the "signified-actants" in the signification processes are working in digital education.

Multiple Passage Points

In the last decades, digital technologies have been brought into school activities as mandatory passage points (Latour, 1988) for learning. Digital technologies become naturalized based on societal and individual justifications of their capacities for promoting self-efficacy, self-regulation, metacognition, and overall enhancement of learning (Duval, Sharples & Sutherland, 2017), which risk backgrounding a recognition of how the technologies act as social determinants. The technologies' roles as actants (Latour, 1994) are in this paper linked to their semiotic regimes (Djonov & van Leeuwen, 2018a; van Leeuwen, 2005), which can mediate social practices through their capacities, functions, and designs. These components are in the front-end-back-end continuum and therefore variously aware by and available to the users. Hence, users' possibilities to manipulate and act is related to what properties are configured from the combination of semiotic resources (hardware – devices, processors, system software, accessories, software: application systems, and sign systems: different symbolic signs composing the physical and symbolic technological design features, O'Halloran & Smith, 2013; van Leeuwen & Djonov, 2013). Those properties are more or less known to the users and selected for learning purposes, but also made explicit by corporate companies' updates, prioritizations, and choices. Thus, back-end algorithms prompt certain features on the front-end that come to privilege and evolve particular learning trajectories and social practices (Djonov & van Leeuwen, 2018b; Jewitt, 2008; Moschini, 2018; Poulsen & Kvåle, 2018). There are interests in negotiation, making up associations where a "new whole" arises, more complex than the "particular whole" of the user, the technologies, and their sign systems.

From a signified-actant perspective, the differences between web browsers can be explored beyond an anthropocentric view of them as customizable tools to meet the various human interests. Browsers have interests in the back-front-end and influence the user-student subjectivation processes. From these differences, we can reflect on technical learning as social learning. The difference between internet browsers can be understood as differences between which worlds are presented to students during their online browsing, and hence, how learning about technically mediated social life is possible. For instance, browsing in Google Chrome tends to have Google sign systems presented as tools for using the internet, known as "web 2.0". Users (non-specialists in digital technologies) can create and disseminate texts, communicate, exchange files, and even make the internet space a tool for the democratization of political life (Junior, Lisbôa & Coutinho, 2011). Lower costs and social power are necessary to occupy the internet, where Google has entailed a revolution (Ibid.) in communication. Thus, Google, Microsoft, and other corporations become hegemonic on the internet as they are

the leading investors and creators. On the one hand, navigation in Brave Browser offers web navigation similar to Google. On the other hand, navigation differs significantly because Brave exposes students to the political and economic contradictions of the web 2.0. For instance, Brave blocks advertising and exempt the users from surveillance and the commercialization of personal data. Simultaneously, the Brave browser promotes various companies' propaganda generating and gain income from blockchains and other technologies that favor data transparency and security. Internet navigation with the Tor Browser exposes students to a space of political contradictions in the infrastructural, technical order. This browser invites users to structure and operate the internet with greater anonymity and less traceability decentralized from the USA. As can be seen among internet browsers, technical differences have their existence in social and political differences, which are presented to students during the use of these technologies' interfaces. In educational perspectives that value the development of human skills in digital contexts such as computational thinking and digital culture, the exposure to different web browsers favors the denaturalization of the digital world as only instrumental and a learning process that identifies and reflects on the different humans and non-humans actants' and signifieds' organization of current life. Thus, contradictions between monopolies and local economies, which underlie contemporary capitalism and citizen empowerment, structure the internet. A well-known fact is that countries and large digital technology corporations have been repeatedly requested to elucidate how their interference in social behaviors consists of what Zuboff (2015) conceptualized into surveillance capitalism. However, the alternatives, such as Brave and Tor, need to be illuminated from a critical perspective too. Educational settings that pay attention to the sociotechnical characteristics of the technologies have a broaden perception of learning improving critical education and democratic values exemplified by a theoretical association between Paulo Freire's critical pedagogy and Bruno Latour's actor-network theory (see, Schiavetto & Schnaider, 2021). Mainly, because the composition of interests into signifieds represented in specific ways on the back-front-ends become re-signified by the actants into various digital meaning-making trajectories.

Similarly to web browsers, each search engine (i.e., Google, Bing, and Duckduckgo) are ongoingly translating and composing websites for indexing, which capitalizations of user navigation are tolerated, and who participate in the construction of the sociopolitical ideas structuring the decision about indexing and, therefore, the function and visualization of the representations on the internet itself. Depending on the techno-educational contexts of each school environment, students' learning is technically and visually mediated by such and other signifieds and actants, which highlights the non-neutral character of learning assisted by digital technologies. Rigorously, there is no assistance and plain operational use, but signifieds, actants, re(associations), and re-signification continue in the users' meaning-making interpretation with technological prompts. The choices of what digital technologies to use as packages of semiotic resources then profoundly involves the acquisition of a teaching-learning context as they enact limitations or affordances for diversity in technical and semiotic mediation with impact on how cognitive processes of actions and sign-making are transacted into various meaning-making trajectories with bearing upon the subjectivation processes (Bezemer & Kress, 2016; Jewitt, 2008; van Leeuwen, 2008). Such variations emerge in particular multimodal semiotic activity systems that influence the technology users' learning development prerequisites. On the one hand, acquiring different technologies that to a certain extent provide the same experience (internet browsers – Google and Tor; operational systems, Windows and GNU/Linux; cloud computing, Microsoft and Nextcloud; e-mails, Yahoo and Protonmail; text editors, MS-Office and LibreOffice; etcetera) will eventually be considered a redundant and even a costly action for most schools. On the other hand, the technologies have different signifieds and actants and translate variant outcomes that, in the end, have consequences for learning.

The approximation of ANT and representational perspectives in this paper can assist in exposing the technologies' interests and non-neutrality in education from a detailed perspective on their capacities, functions, and designs. Furthermore, educational practices that reveal the contradictions of social existence are essential for learning, as they favor denaturalization conditions and critical skills development. As shown in the example about internet browsers, technology-mediated educational practices can create opportunities for the students to appreciate and reflect about the different signifieds and actants active in determining their actions, thoughts, and feelings.

Aim and Purpose – Study Design

The research proposal made in this short paper intends to approximate ANT and representational perspectives. The future objective is to enrich scientific analyses on the representational agency's signified-in-transformation and actants relationships. Thus, the research question that guided the work - who acts in the process of signification in learning activities with digital technologies? - is suggested for theoretical conceptualizations and philosophical examinations of the technology-user relations in a networked learning context.

In an approximation of signifieds and actants, the different processes mediated by technologies can be starting points for tracking translations and, subsequently, elaborating the socio-technical cartographies acting in learning and education. Such an analysis can enrich the understanding of technical mediation and visualization of the interests of the technique, and semiotic studies can help to understand the differences in technical forms, in the configuration of sign systems in the human-technology signification. Relations between students and browsers, operating systems, emails, text editors, microcontrollers, robotics and hardware, software, and so forth, can be investigated beyond their immediate and more common technical functions, by a theoretical-methodological relationship between signifieds and actants that helps in exposing the non-neutrality of technique and subsequently its social existence. Such conceptualizations and examinations can be helpful in scientific studies interested in how students and teachers appropriate technologies, incorporate them into educational practices, create meanings, and the manner in which the teaching-learning process solidifies ways of acting, thinking, and feeling. Furthermore, such conceptualizations and examinations can favor schools in ongoing considerations about the technologies present in education and their impact on teaching-learning, favoring students, teachers, and administrators to maintain a broader critical awareness of non-human actants. These studies can also favor the development of educational policies, as they can be valuable resources for scientists and educators in general. In conclusion, education with technologies is a matter of signified-in-transformation and actants translating interests in the creation of subjectivities. They interferes in social power relations into various meaning-making outcomes – a point of interest to the evolvement of science and education with impacts on society.

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