

ICT in Education: personal learning environments in perspectives and practices of young people

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Abstract

This article examines conceptions, practices and perspectives on learning with ICT of a group of young people engaged in secondary education. The text is based upon a social semiotic analysis – following Kress and van Leeuwen’s grammar – of 19 drawings and 14 interviews, part of a data corpus collected in a broader piece of research that aimed at exploring the possibilities of integrating the idea of Personal Learning Environments (PLEs) into a school setting. The discussion suggests that, in representing their PLEs, which show uses of ICT tools to support learning, including social networking platforms already integrated into their repertoire of learning resources, these young people do not present innovative or uncommon uses of digital artefacts. In fact, the drawings appear to be characterised by an absence of creative activities and other forms of productive engagement with their immediate environment and the world: the young people seem to position themselves, predominantly, as receptors, suggesting that their appropriation of these technologies is strongly mediated by a traditional and hierarchical school culture. In revealing a picture marked by the mere reproduction of relations that are typical of a banking education based upon a pedagogy of transmission, the discussion points to the limited usefulness of the *digital natives* category, challenging decontextualized, Promethean expectations of ICT’s transformative potential.

Keywords

ICT in education – Personal learning environments – Young people – Digital natives – Visual social semiotics.

Introduction

Discourses on Information and Communication Technology (ICT) in education reflect conceptions of technology generally positioned as one of two extremes identified by Rüdiger (2011): on the one hand, so-called Promethean views, excessively optimistic,

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ascribe technology the status of a road towards human redemption; on the other hand, Faustian views starkly warn us about the dangers of dehumanisation (MARTINS, 1997). Hence, in literature in the area of ICT in education, prescriptive discourses, based on a type of fascination with the possibilities of technology, oppose discourses that denounce education's precariousness and, in particular, the exploitation and demeaning of teaching.

In particular, Promethean ideals support the proliferation of labels that, whilst proposed as *novelties* or *solutions* to ill-formulated *problems*, are often discussed without consideration of the area's history, contingencies or any sort of specificities. This state of affairs, according to Selwyn (2015), obscures crucial implications of the relationship between education and technology. In order to escape these binaries, the interlace of education and technology, that is, "Educational Technology must be understood as a knot of social, political, economic and cultural agendas that is riddled with complications, contradictions and conflicts", as Selwyn (2014, location 260) has suggested.

This article draws upon a research project that has focused upon one of various labels current in educational technology: Personal Learning Environments (PLE). The expression is relatively recent and encapsulates ideas that imply some form of integration or unification of different Web 2.0 artefacts to support independent or *self-regulated* learning.

Consistently with discourses based on the metaphor of the Internet as space (CRUZ, 2007), the term *environment* gives rise to different ways of conceiving PLE. Whilst Downes (2005, n. p.), for example, has indicated that a PLE is "not an institutional or corporate application, but a personal learning centre, where content is reused and remixed according to the student's own needs and interests", Siemens (2007, n. p.) has suggested that "PLEs aren't an entity, structural object or software program in the sense of a learning management system (LMS) [...] PLE are a concept-entity". Given the multiplicity of existing views, the status of the concept described by Attwell (2007) remains almost unchanged: the points in which all definitions of PLE seem to agree are that they are not merely a type of software application, and student autonomy is fundamental.

The term *personal* also creates ambiguities reflected in the existence of different models (e.g. MILLIGAN et al, 2006; HALL, 2009; WILSON et al., 2007). As Archee (2012) has suggested, *personal* can refer to a student-centred pedagogical approach, albeit institutionally driven, but it can also imply a vision centred on the student, to which the traditional "instructional" [sic] role of educational institutions must be subordinated. Further, *personal* may indicate the need for a relatively sophisticated user, who already has experience and fluency in the use of various applications and tools to create their own informal networks.

In Higher Education (HE), at least, Archee (2012) has suggested that, despite constituting a new area, PLE will have a "Faustian effect" comparable to that of LMS, partly because of a perceived precariousness of teaching-learning associated with institutional changes implemented purely on financial bases. Studies such as Conde et al. (2014), which aimed at integrating PLE with LMS, indicate a measure of "institutional discomfort" with regard to PLE may actually exist. In this sense, PLE are opposed to Virtual Learning Environments (VLE), which are usually software platforms maintained and managed by educational institutions, in arrangements that connect learning and internal administrative systems.

Although the literature in the area seems to focus on conceptual discussions or case studies on HE, including examples of investigations in teacher training contexts (MARÍN et al, 2014), some attempts have been identified that aimed at exploring the possibilities PLE can offer to school age youth. In some of these studies (e.g. KUHN, 2014), the expression *digital natives* is often used to describe members of the age group in question.

Digital natives is a label widely disseminated in the academic literature and in media discourses alike, in discussions on the uses of ICT by young people, in particular, Web 2.0 artefacts. According to this categorisation, which refers to the generation born at the turn of the millennium and brought up with the ubiquitous presence of digital artefacts (PRENSKY, 2001a; 2001b), young adults and children tend to be portrayed as proficient, fluent or innate masters of digital ICT. However, these descriptions seem to grossly naturalise the complex relationship between the individual, the social and the technical. Whilst it may be possible to imagine significant changes in the socio-cognitive structure associated with new contingencies driven by technological innovation (MONEREO; POZO, 2010), there is compelling evidence that this picture does not correspond to what actually occurs and, much less, universally. With recourse to empirical data (BENNET; MATON, 2010; THOMAS, 2011; JONES, 2012), it is possible to envisage that such changes seem to operate much more slowly – and far less revolutionarily – than the discourses of the Information Society (CASTELLS, 2010) promulgate.

Context and methodology

This text draws upon a piece of action research that had the overall aim of investigating the potential of PLE-related practices in a Brazilian high school. The intervention, conducted in 2013-2014, involved 56 students aged 16-17 years and enrolled in an integrated professional course in Computing.³ As basis for the various activities involved in the intervention, carried out by the second author and teacher in the course, a generic conception was proposed for PLE as a *space* constructed by the learner integrating different artefacts and learning practices. The intervention was conducted to encourage students, with different levels of scaffolding (DANIELS, 2001), to conceive and create their own PLE to support teacher-led classroom activities. The text focuses on data obtained at the end of the intervention period.

In order to foster reflection upon the work conducted during the last semester of 2014 with one of the student groups, the teacher distributed a questionnaire containing open questions and a request for a drawing of their respective PLE. Following the week allowed for the questionnaire to be returned, and as permitted by circumstances, individual interviews of 10-15 minutes were subsequently conducted with a group of 14 students, all aged between 16 and 17, including seven participants who had not presented drawings of their own. The interviews revolved around exploring three drawings selected by each respondent, focusing

3- Integrated education in Brazil involves full-time study with contact hours split between academic training (which covers the core curriculum) and professional training (which qualifies students as technicians in a given area, e.g. Computing).

on aspects of their interest as well as similarities and differences between the selected images; in the case of authors, the discussion revolved around their own piece and its creation.

The drawings were analysed using Kress and van Leeuwen's *Grammar of visual design* (2006), which takes iconography as basis for exploring and analysing symbolic structures. The interviews aimed at allowing access to meanings shared within the group, enabling a sort of triangulation, since, albeit immerse in the discourses of *digital natives*, the participants constituted a group with idiosyncrasies of their own, usually ignored in the coarse descriptions reproduced by these discourses. This text presents some of the findings obtained in this analysis, illustrated with nine of the 19 drawings created by the participants, herein mentioned with the use of pseudonyms.

Theoretical framework

According to Jewitt and Oyama (2001), the social semiotics of visual communication describes and analyses what can be said and done with images. Whilst structuralist semiotics conceives of semiotic systems as sets of rules that relate signs and meanings shared amongst individuals who have mastered the same code, social semiotics describes these systems as sets of *resources*. The structuralist description with shared codes may be adequate for prescriptive systems (for example, traffic signs), but it is not appropriate for situations in which there are no such codes, such as children's drawings and art objects. In these cases, there are still rules, including prescriptions, best practices, influence of models, specialists' recommendations and habits, but adherence to these depends mainly on the context of production. From this perspective, interpretation or reading is a tentative process of understanding a context that is broader than the artefact or object in question, since the resources used to create images are characterised by a historicity that ascribes them a double status of "products of social history and cognitive resources used to create meaning in the production and interpretation of images" (JEWITT; OYAMA, 2001, p. 136).

The analysis presented below has used elements of Kress and van Leeuwen's (2006) *grammar*, which, using a tripartite analytical framework based on Halliday's systemic grammar (HALLIDAY, 2014; FUZER; CABRAL, 2014), explores meanings in three domains that operate concomitantly: representational, interactive and compositional. In the representational domain, the *grammar* classifies images as narrative representations or conceptual patterns, depending on the spatial relationships between their elements (participants) – people, places and things (concrete or abstract). In narrative representations, these relationships are presented in terms of actions, events or processes constructed through connections (vectors) between participants. In this manner, narrative representations express dynamic relationships, actions or events through the indication of directionality. On the other hand, conceptual patterns represent participants in more general and stable forms, as *essences*, that is, in terms of features or components. This category includes symbolic structures such as maps, pie charts and, crucially in the context of this study, flowcharts and other diagrams used in the teaching and practice of computing.

Amongst the analytical categories included in the interactional domain, the analysis presented below focuses on *contact*, *viewpoint* and *distance*. The notion of *contact* is materialised in images of *demand*, which suggest a symbolic demand from

a portrayed character in respect to the observer, and images of *offer*, whereby a more detached and impersonal relationship is suggested between participants and observer. Thus, it is possible to infer power relations between image elements and between this and the observer, always in context. Power relations may be represented also in terms of symbolic connotations suggested by different *viewpoints*; for example, *to look down* may indicate a hierarchy between the creator, the object and the observer, whilst *to look at* may suggest involvement with or distance from that which is represented. *Frontality* indicates maximum involvement, confronting the observer directly with elements of the image, whereas, if something is shown laterally, marginality may be indicated, or the quality of being subsidiary, lateral or secondary.

In the compositional domain, Kress & van Leeuwen (2006) have suggested that the relative location of elements in a composition have informational value. The authors propose a given-novelty structure in the arrangement of elements along the left-right axis of an image, reflecting the writing convention associated with the Latin alphabet (left-right, top to bottom). The arrangement also suggests an ideal-real relationship on the vertical axis, in which the ideal is presented on the top in opposition to the real at the bottom, *feet on the ground*. In addition, centrality of an element in the image suggests it contains, possesses or governs everything else that is lateral or marginal, depending on the context. Framing relates to the use of connecting and disconnecting elements between participants: lines (vectors), spaces, colours or any other visually significant contrast that may express separation (otherness) or belonging. Saliency, that is, emphasis on a participant, is realized using different sizes, colours, textures and shading. In this way, different participant positions in the image express different views and values, visually realized through the prevalence of a participant (e.g. area of the image dedicated to a human figure or specific artefact).

Spaces, artefacts and processes

Ana's drawing (Figure 1) illustrates the types of narrative representations identified in the sample analysed.

Figure 1 – Ana's drawing



Source: research data.

Structured as a three-stage process, the drawing presents, in each stage, descriptive elements of an action carried out in a given space using certain objects. Curiously, it contains an inconspicuous yet ubiquitous presence: a mobile phone. The composition shows the human actor from three perspectives. At the centre of the image, she sits at a table, serene and smiling: would she be smiling just for the teacher, who requested the drawing, in a carefully composed image of offer? On the right-hand side, also smiling, she reads, equally accompanied by the phone: would this suggest she has the world, or perhaps, knowledge at her feet?

The image seems to represent a process that unfolds in a universe of potentially special significance for many of the young people who produced the images: a bedroom. However small, the bedroom is a personal space, but also, occasionally, a social area, since it may welcome chosen visitors to the family home. It is an important place for the young person, a space of activity, reverie, reflection and encounter with the *I* and the *other* whom it may, perhaps, accept.

In her interview, Ana confirms this and adds:

Extract 1 (Ana): the computer is always on.

Talking about her chosen drawings, amongst which she includes her own, she also suggests that:

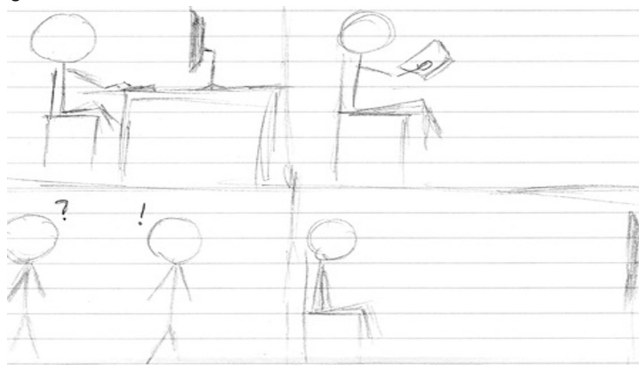
Extract 1 (Ana): almost all the drawings say the same thing.

Ana reckons the images show that everyone studies in the same way she does:

Extract 3 (Ana): first, I search on the Internet, then I put notes together with the books that the teacher indicated, and then I sit alone and study.

Classroom notes register information provided by the teacher and appear often in participants' comments as their starting point. However, only two other drawings show comparable sequences to Ana's, and Figure 2 presents one of them, created by Luís.

Figure 2 – Luís' drawing

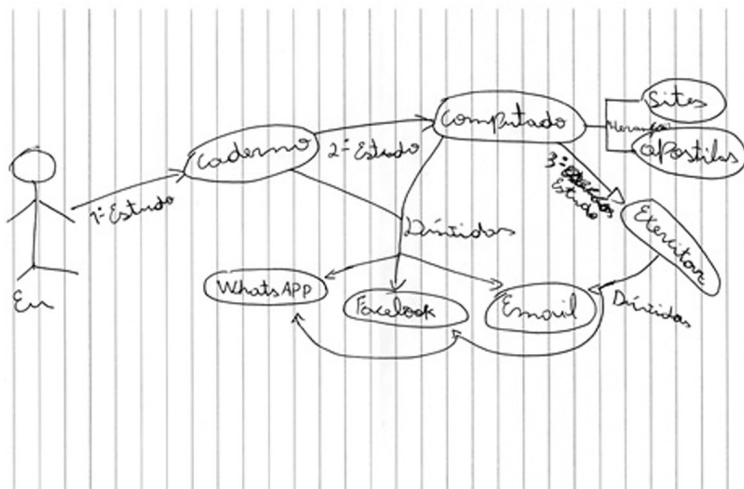


Source: research data.

Luis' drawing resembles a comic strip: a sequence of 4 frames that show specific actions, to be read from left to right, top to bottom. The author is present as a stick figure, devoid of expression indicators: a *tabula rasa*? The first frame suggests an ambiguity: whilst the human is in contact with the keyboard, with arms and fingers suggested as vectors associated with potentially creative processes, little can be said about the action represented in a narrative in which he takes, predominantly, a position of spectator. Would he be programming or just *surfing*, *browsing* the Web? Even within the frame where the *other* appears, the question and exclamation marks suggest a straightforward transaction, a rapid question-answer exchange, the search for a correct answer to fill in a gap, i.e., mere information gathering.

In fact, conceptions of *doubt* (in Portuguese, *dúvida*) appear in other drawings as well as comments in the same way: a gap, a void to be filled, a missing piece from a puzzle. In Carlos' drawing (Figure 3), the term occupies a place of centrality.

Figure 3 – Carlos' drawing



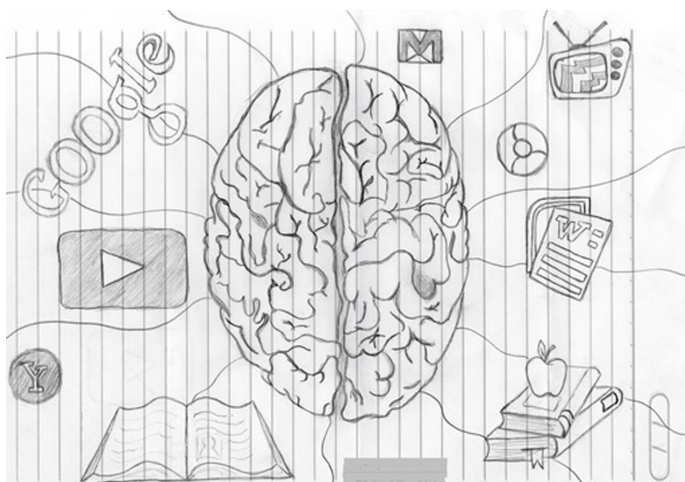
Source: research data.

The word also appears below, to the right, in association with the vector linking the action of *exercising* (*exercitar*, in Portuguese) with *e-mail*. The image makes use of a single anthropomorphic component, presented as the *I* (*Eu*, in Portuguese), and constitutes a scheme reminiscent of flowcharts, a type of representation with which Carlos and his colleagues were already familiar. The drawing also incorporates a concept brought specifically from object-oriented programming (OOP), *inheritance*. In OOP, *inheritance* is a type of relationship between object classes whereby a hierarchy is defined so that a class *derived* from another is said to inherit its characteristics. In the drawing, sites and hand-outs (*apostilas*, in Portuguese) are classes derived from computer (*computador*, in Portuguese), i.e. they appear as instantiations of specific affordances of the computer.

In his comments, Carlos explains that sites refer to video-sharing platforms that host recorded lectures, suggesting his conception of learning with the computer predominantly excludes interaction.

Recorded lectures (or indications of related sites) appear repeatedly in comments as well as images. In general, the artefacts shown in Carlos' drawing are recurring in the sample, but in Danielle's drawing (Figure 4) they appear in a unique way.

Figure 4 – Danielle's drawing



Source: research data.

The drawing is dominated by a detailed and careful representation of a brain, which, at a first glance, might seem connected to the other participants by radial lines. Most of the objects reproduce logos of Web-based services, carefully outlined through delicate, yet firm, trace. The exceptions are the open book at the bottom left of the image and the interesting composition that includes a well-outlined apple on a pile of books, positioned at the bottom right, which the author explains:

Extract 4 (Danielle): it is like those old stories, even in Chaves⁴, when you went to school and took a little apple to the teacher.

Danielle's drawing raises broad questions. The lines do not seem to function as vectors: a timeless universe appears to be configured, wherein various elements, some profoundly symbolic, are disposed without any categorization, order or obvious relationships. Also, the lines do not appear to be arranged as a network, one of the most powerful metaphors

4- *Chaves* is the Brazilian title for the Mexican TV comedy show *El chavo de oro*, produced in the late 1970s and still broadcast in Brazil with much success.

of the Internet, that is, they do not characterise a system of connections, but, rather, the composition of a background, an environment in which objects appear to flow. She explains the arrangement:

Extract 5 (Danielle): I found mine very creative, different from the others. [...] I put, like this, the part of the brain, the brain absorbing everything that is outside.

Danielle thus reveals that *inside* and *outside* are the two main concepts represented in the image, consistently with a perception of circularity, which Kress and van Leeuwen (2006) have interpreted, symbolically, as a device used to naturalise a representation or represent a naturalised view. There is an associated concept: the idea of *absorption*. The image, thus, can be understood as a conceptual representation that suggests learning as a purely cerebral activity. The body is absent, and the human is present as a “cerebral subject” (ORTEGA; VIDAL, 2007), which is “specified [by] the property or quality of *being*, rather than simply having, a brain” (VIDAL, 2009; author’s emphasis). There is no evidence to suggest the presence of the *social* or the *other* beyond the possibilities offered by technological mediation. Danielle’s drawing, in fact, reproduces an arrangement easily found in online searches with the keywords *brain*, *web* and *network*, an arrangement that suggests links to images of science fiction (and cyberculture – LÉVY, 1999 – or cybercultures – BELL, 2011), in which learning is an accelerated process of direct download – of specific *knowledge* and/or *skills* – to the learner’s brain, as epitomised in the film *The Matrix* (1999), amongst others.

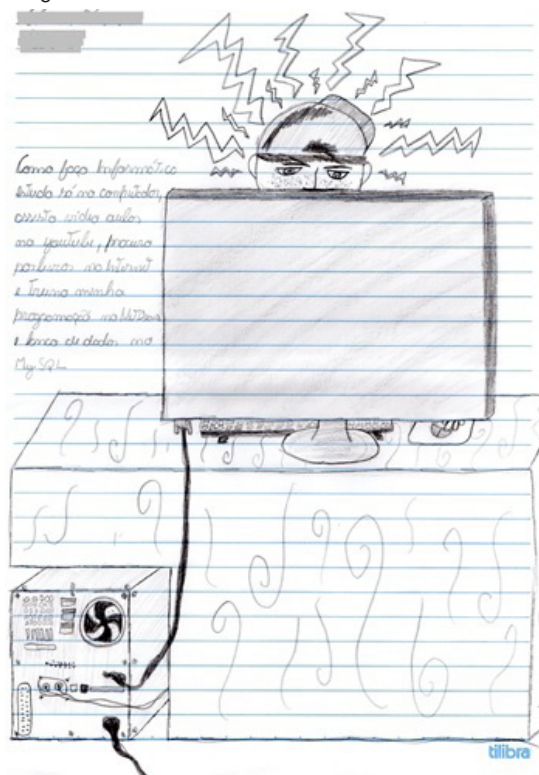
On the other hand, Beatriz, who also presented a drawing of her PLE, suggests an interesting counterpoint to the ideas encapsulated in Danielle’s talk and image:

Extract 6 (Beatriz): There are people who study on the Internet [...] and can do so [...]. With some people, it is writing, they need to take notes, and that is why I like books. On the computer you don’t take notes, you don’t highlight. [...] By hand, you highlight, you mark.

Beatriz rescues a role for the body and physicality in the learning process, but differently from Osvaldo, whose drawing is shown in Figure 5.

In contrast with Danielle’s, his drawing suggests a form of bodily presence that seems endowed with more concreteness, intention and action, albeit partially concealed. Facing the observer, seated at a decorated table (would those marks be interrogation marks or, drawing upon musical notation, bass clef signs?), looking at a screen, the human actor shows only part of his head and part of the fingers handling the mouse. Drawn in detail are the visible parts of the keyboard and the back of the computer, where ports of the usual machine interfaces, as well as the fan, are shown. The gaze is fixed on the screen, and graffiti-like signs appear to originate from his head, suggesting thoughts or, perhaps, some form of affective reaction. Whilst the human figure does not appear entirely, the contents of the screen area visible only to the represented actor.

Figura 5 – Osvaldo's drawing



Source: research data.

According to Kress and van Leeuwen (2006), the positioning of image elements along the left-right and top-bottom directions endows with meaning both the location of the author's name at the top left of the image (obscured with a grey box) and the positioning of the explanatory text. From this perspective, the young adult reasserts his importance through a double self-representation, that is, both textual and pictorial, suggesting questions of power. Conceiving the written text as a specific form of the visual, the authors suggest a parallel with verbal communication, where paralanguage is essential, claiming the written text “involves more than the language: it is written in something, in some material [...] and is written with something [...] with letters formed as typefaces” (KRESS; VAN LEEUWEN, 2006, p. 41). Combinations of text and image in different arrangements suggest authority and priority relationships not only within the composition itself, but also in the interactional domain.

In Osvaldo's drawing, the human participant is displayed at a slightly lowered angle relatively to the observer, suggesting a relationship of subordination to the observer (the teacher). On the other hand, the directionality of the actor's gaze suggests a transactional process whose goal (what is on the screen) is hidden from the teacher-observer, while the explanatory text is positioned to establish its *authority* as source of information on the

scheme. Curiously, the text presents a causal and *technical* explanation of his *method*, articulating a *how* (study process) to a *why* (Computing as the context). Thus, great care is revealed in a representation that does not show the viewer what is in fact happening on the screen. The drawing combines elements of an offer image – in that it shows a personal space – with those of an image of demand, as, in being personal, it suggests discretion and requires privacy.

The focus and discretion suggested in Osvaldo's drawing contrast starkly with the image produced by Valéria, shown in Figure 6.

Figure 6 – Valéria's drawing



Source: research data.

Whilst the young man is a first-year student, Valéria is finishing her last year, and her drawing possibly reflects the scenario envisioned by many at the same stage of schooling: multiple commitments, demands, concerns and desires. With her back to the viewer, a human figure sits at a table with several objects: to her right, a pile of closed books; to her left, a pencil holder and a small notebook computer, which the author uses in classroom. Also to her right, an open book or pad can be identified, albeit not entirely seen. There are four drawers, all closed; what might they store? She seems to be scratching her head, whilst her right hand appears to hover, open, fingers visible. Her physical space appears orderly, organised, but the figure suggests herself as paralysed, dealing with a host of conflicting thoughts. She occupies the centre of the image, whilst on its top, there is an empty rectangle: would that be a window?

The balloons and labels circling around the actor's head evoke the author's concerns, interests and desires, suggesting a certain confusion, excess of interests, ambitions (or ambition) or doubt. Considering her life circumstances, the composition presents itself as an attempt to prioritize.

Ana, the author of Figure 1 and also a 3rd year student, identifies with the picture painted by Valéria:

Extract 7 (Ana): She's at the computer, just like me, as I am, thinking about a lot of things at the same time. I get distracted.

The term *distraction*⁵ provides one of the most frequently recurring elements in the comments, as illustrated in the following extract:

Extract 8 (Beatriz): On your computer you do not memorise, and on the computer you get distracted a lot.

The idea is most clearly represented in Eduardo's drawing (Figure 7).

Figure 7 – Eduardo's drawing



Source: research data.

The image displays a room with various objects carefully drawn and positioned, albeit devoid of human presence. In a perceptibly optimistic tone of voice, the author comments on his piece:

Excerpt 9 (Eduardo): My drawing was about the computer. We still have books, there is still a light, and this is why I put these thingies coming out. But we have the computer. It gives, in

5 - Literally, the word used in Portuguese for "distraction" is *dispersão*, which would literally translate to *dispersion*; *distraction* is an appropriate equivalence for the context, although the translation removes interesting further connotations related to *losing the sense of unity and dissolving*.

addition to light... it also has all the information that comes out, seeks you out, takes you to other information. [...] Books give light, but the computer is like a monster that grabs you and can lead you to other sites.

The young man's comments have an internal inconsistency, but his intonation supports an understanding that Eduardo sees the internet, the *monster* represented in his drawing, as a kind of *gentle giant* that leads him to adventures. In contrast, Tadeu seems to recognise the ambivalence that Eduardo does not clearly acknowledge:

Excerpt 10 (Tadeu): The Internet can be a monster; it can be your worst villain, as it can be your best friend. The Internet is a monster out to get you while trying to help. The tentacle is lack of responsibility; distraction is the bad side of the Internet.

Valéria shares Tadeu's perspective:

Extract 11 (Valéria): The Internet, the computer, even, is good and bad for me. At the same time that I can use it to study, I get distracted, log on to Facebook, open Skype. Then something shows up that takes away my focus. [...]. It's temptation.

In general, the set of drawings suggests different configurations of *space*, covering concepts with a higher degree of materiality, such as Eduardo's drawing, *psychological spaces*, as in the case of Danielle's image, and a variety of hybridized spaces. Amongst the 19 drawings, only 11 contain human participants or indications of human presence. The PLE of these youngsters present themselves as spaces that are based on, mediated or remediated by digital technologies.

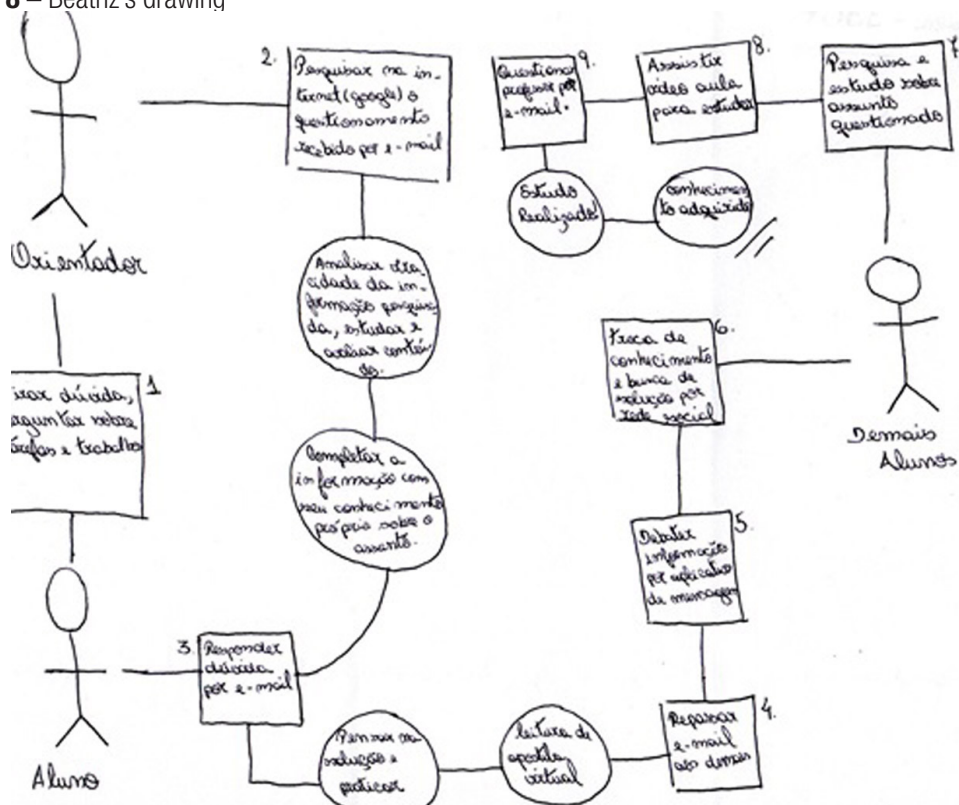
Linearity, creativity and authority

Most of the drawings analysed (12 of the 19) are, in Kress and van Leeuwen's (2006) categorisation, narrative representations, suggesting that, in their appropriation of the generic idea of PLE proposed along the intervention, youngsters focused on procedural aspects, that is, on notions of learning as something that unfolds in time and space. However, the processes suggested by the drawings are, in their overwhelming majority, linear, as illustrated by Ana's (Figure 1) and Carlos' (Figure 3) work. The latter, in fact, is one of three schemes akin to flow charts, images that, according to Kress and van Leeuwen (2006, p. 62), "represent events that occur over time as spatial configurations and thus turn 'process' into 'system.'" According to the authors, as is the case of nominalizations in scientific and bureaucratic writing, such schemes have the effect of transforming actions in relationships, providing decontextualized and generalising representations that reduce human agency to objects in a system of relations.

Beatriz's drawing is another example of scheme similar to flowcharts (Figure 8). The same peculiarity of Carlos' design – the lack of optional paths – can be seen. It is also interesting to note that, except for a symbolic presence in Danielle's drawing (the apple

on the pile of books, Figure 4), Beatriz’s drawing is the only one in which the teacher appears explicitly, as supervisor (orientador, in Portuguese), the *authority* at the top left of the scheme that leads to the state of *knowledge acquired* (conhecimento adquirido, in Portuguese).

Figure 8 – Beatriz’s drawing



Source: research data.

The term *doubt* (*dúvida*, in Portuguese) appears linked exclusively with the *supervisor* (*orientador*, in Portuguese), whilst appearing twice in Carlos’ drawing (Figure 3). In the latter, it functions as a label for a node that could be thought of as a decision structure, albeit not explicitly represented. Decision structures are programming constructs used where a choice must be made to determine the next step to be executed by the algorithm, yielding different results depending on the context. The drawing indicates possibilities of unforeseen results depending on contingencies, but it does not indicate criteria, order, or priorities to guide action when *doubt* presents itself. In Brazilian Portuguese, the words for *node* and *knot* are homonyms, but *knots*, which are tied and untied, refer, metaphorically, to problems or confusing situations; in Portuguese, specifically, *untying a knot* may suggest clarifying a messy situation or removing obstacles in a predefined route. Hence,

considering the drawing is proposed as a representation of the author's ways of learning, it seems to exclude possibilities opened by serendipity or contingency: the itinerary is fixed and the goals and objectives are previously outlined, which leaves no room for course corrections or change.

The "tentacles" in Eduardo's drawing (Figure 7) provide an interesting contrast to the lack of opportunities to choose linked with the linearity of the processes represented in most of the drawings. Representing the Web's hypertextual nature, the tentacles emerge as a challenge: on the one hand, the *monster* that points to adventures and discoveries; on the other, the *bad side* of this adventure, the *spectrum* of distraction that beckons and deviates from the prescribed path. Hence, our data does not support the notion that "digital natives prefer their graphics before their text rather than the opposite. They prefer random access (like hypertext). They function best when networked" (PRENSKY, 2001a, p. 2). On the contrary: the uses of Web technologies represented in the drawings are quite limited and not *spectacular* and, as suggested by Buckingham (2011, location 124), "are characterized not by dramatic manifestations of innovation and creativity, but relatively routine forms of communication and information retrieval". Additionally, the scenario presented by Valéria (Figure 6) is consistent with the author's subsequent considerations: "contemporary children have many of the same interests, concerns, and preoccupations as children in previous generations – even if the ways in which they manifest these through their use of technology as likely to be rather different" (BUCKINGHAM, 2011, position 124).

In addition, Danielle's drawing (Figure 4), as an object in itself, raises questions concerning the hypothetical *creativity* of young people in two ways: firstly, because it reproduces an arrangement that circulates widely on the Web; moreover, and perhaps more importantly, it represents a conception of learning as absorption, a process that has nothing particularly creative in the sense normally suggested in technophile discussions. From amongst the objects shown in the picture, a number of Web applications recur in participants' talk and drawing, including Google's search engine, which appears as the main door to the Web and is present in almost all images. In addition to Google, *Yahoo Answers* appears repeatedly as a first port of call, although the uses of both platforms appear consistent with what Kennedy and Judd (2011, location 2756) describe as *satisficing*, a term coined by Simon (1955, apud KENNEDY; JUDD, 2011) to describe actions that follow decision-making based upon reductionist and biased strategies. Tadeu's commentary perfectly encapsulates the notion:

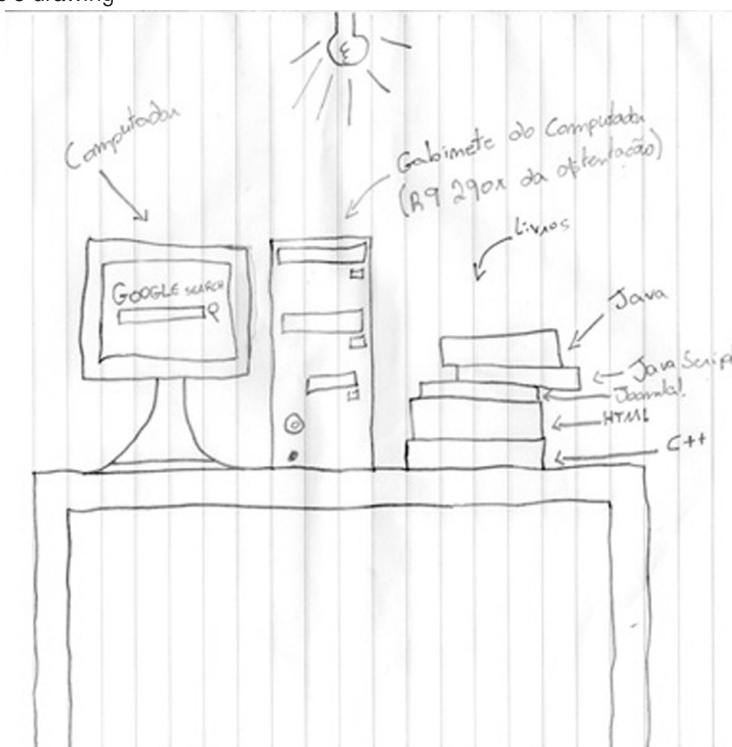
Extract 12 (Tadeu): I think 95% of all people use Yahoo [Answers] wrong, that is, getting others to do their work. [...] The good side is [...] sometimes I see discussion and different answers. If the person bothers to read the different answers, he is already studying.

Tadeu points to the lack of engagement of his peers with school tasks, explaining the practice of using the site to request solutions and ready answers. The same idea permeates their uses of YouTube, a site for sharing audio-visual material repeatedly mentioned by participants and strongly present in their drawings. Although the platform also supports creative activities, the uses suggested by the participants in our research

invariably reduce possibilities to those of a simple recorded lectures access portal. The banking model of education, albeit heavily criticized in pedagogical terms, seems to be hopelessly entrenched in these young people's ways of thinking and acting, as well as their expectations. The importance of dialogue and interaction appear only in association with *doubt*, that is, learning is reduced to obtaining and retaining information, which is not always facilitated using digital artefacts, as Beatriz suggests when claiming that "on the computer, you do not memorise". Despite showing elements of interaction with other students and, in two cases, the teacher, the drawings reduce learning mainly to *studying*, which is reduced, in turn, to watching, reading, receiving.

Despite the diversity of forms taken by the drawings, processes that indicate more concrete and constructive actions, tangible transformation or, crucially, intervention in the world are almost entirely absent from the drawings. There are specificities in the conceptual structures integrated into the narratives presented, as well as images constituting conceptual patterns, that is, *atemporal* representations that, in some cases, indicate relationships but, predominantly, simply provide a visual inventory of objects, often in spaces devoid of human presence, as illustrated with Silvio's drawing (Figure 9). He even specifies every object displayed with a label, including the video card (R9 290x) that suggests he uses the machine for gaming.

Figure 9 – Silvio's drawing



Source: research data.

Autonomy, a central term in PLE dissemination discourses, is a theme strongly associated with *authority*, represented in different guises in drawings and talk. In the drawings, the notepad, the notebook and teacher hand-outs feature with different emphases across images, and the book seems to have its status linked with specificities of each author's universe of interests and background. Their talk, however, is more unequivocal:

Extract 13 (Ana): The books represent what I learned in school, which was passed in school.

Extract 14 (Carlos): The notebook represents knowledge.

Extract 15 (Valéria): You must have a school to determine what is important.

Young people keep notes on their books and pads, which *store* knowledge, according to Carlos. Despite the association of PLE to conceptions of autonomy as self-direction, independence and initiative, classes and teacher guidance are seen as fundamental.

Closing remarks

Based upon the empirical data collected in an action research project that examined the integration of a conception of PLE in a school, this article discussed the perspectives of a group of young adults on how they learn with ICT. The text presented findings of a social semiotic analysis of 19 drawings and 14 interviews, part of the data corpus collected in that larger study. The drawings and talk open, naturally, many possible interpretations, meaning the discussion presented above is not suggested as a sole or final reading. However, although this is one amongst many possible readings, the interpretations suggested point to limits of the potential widely claimed as intrinsic to digital technologies.

The uses of ICT represented by young authors in their drawings reveal a ubiquitous presence of social networking platforms as artefacts already integrated in the repertoire of resources they use for learning. However, although it is not possible to qualify the research participants as *passive*, as the reception process is complex and consists in an object of research and debate beyond the scope of this article, the actions portrayed in the images suggest these young people tend to position themselves predominantly as *receptors*. The types of interactions shown, as well as the absence of representations of creative actions and other forms of productive engagement in the world, signal a conception of learning as obtaining and retaining information. In this sense, they seem to evoke the reproduction of actions that support traditional relationships of a banking education based upon a pedagogy of transmission.

Thus, our data reveals idiosyncrasies that are inconsistent with a generalised view of the age group in question and, consequently, highlight the importance of localised, contextualised studies, as defended by Gourlay (2015). Although ICT may have a central role in youth education, with impact yet to be better understood, they may well not be more than means to articulate cultural aspects produced and shared in contexts with specificities of their own. The data collected does not point to examples of uncommon uses of digital artefacts, that is, uses that surpass expectations associated to previous technologies (for example, the printed book and the telephone). Instead, it suggests appropriations of such

artefacts mediated by elements of a more traditional and hierarchical school culture. This reinforces the limited usefulness of the *digital natives* category and clearly challenges decontextualized, Promethean expectations of ICT's transformative potential.

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