Re-imagining literacies and literacies pedagogy in the context of semio-technologies

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Abstract
This paper seeks to explore and re-imagine the notion of literacy, by first reconceptualising it in its plural form as literacies, and second, by embedding it within the context of semio-technologies. From this basis, and employing interface theory, it contends that imagination serves as a launching pad for literacies, semio-technologies and literacies pedagogy. The paper also argues that in its plural form, literacies does not only entail the critical literacies, New Literacy Studies, new literacies and multiliteracies perspectives, but also encompasses other literacy permutations, such as multicultural literacies, pluralistic literacies, globalised literacies, digital literacies, mobile literacies, data literacies and high literacies. In addition, it proposes how literacies can be incorporated into school curricula and taught in both primary and secondary school contexts. It suggests three models (standalone, infusion and cross-cutting models) for curriculating literacies. Lastly, the paper characterises the changing nature of learners and the changing roles of teachers in view of ever-evolving literacies.

Keywords
semio-technologies, re-imagining literacies, literacy orthodoxies, interface theory, literacies pedagogy

Introduction
In the era of what this paper refers to as semio-technologies (see Jones, 2013; Langlois, 2011), there is a need to re-imagine and reconceptualise literacy in its plural form as literacies (International Reading Association, 2009; Summey, 2013; cf. Knobel & Kalman, 2016). Semio-technologies, as a term, is used here to refer to technologies through which all forms of modern day literacies can be mediated and expressed as practised, especially by young users. These technologies have a disruptive and game-changing effect on: how literacies can be encoded; the types of manifestations literacies can assume; and the nature of literacy and meaning-making practices in which users can engage at any given time. Some of the examples of such semio-technologies are: instant messengers (e.g. WhatsApp); social networking sites (e.g. Facebook); microblogging applications (e.g. Twitter); and video and photo sharing tools (e.g. YouTube and Instagram). But it is not necessarily a case of technological determinism when it comes to young users of these technologies. On the contrary, it is the affordances (e.g. instant messaging, Skyping, live-streaming, and video and photo sharing) that these technologies offer their users that are crucial in this user-technology interface.
Most importantly, some of the semio-technologies (e.g. WhatsApp, Facebook and Instagram) are more indispensable to certain types of users than they are to others, while others (e.g. Twitter, YouTube and Skype) are not indispensable to other users. In addition, some of the semio-technologies (e.g. Flipgrid) are domain-specific (can be used only in certain domains), while others (e.g. WhatsApp, Facebook, Twitter and YouTube) are domain-neutral (can be used across domains).

For its part, interface theory (Drucker, 2011; also cf. Ducker, 2013; Farman, 2012; Jones, 2013) is used in this paper to refer to the view that there is an interface (a virtual space) between users and literacies on the one hand, and between users and digital technologies through which literacies are realised on the other. It also has to do with the fact that literacies are practised by users who are socio-culturally situated, embodied and inscribed subjects, and with the view that the medium through which literacies are enacted offers users certain affordances for them to be able to engage in certain literacy practices. In line with the conception of literacy posited by this paper is the fact that imagination is central to how literacies can be enacted and mediated through semio-technologies, and to how literacies pedagogy can be mounted and offered in classroom situations in response to changing literacies. Accordingly, the paper proposes that the primary and secondary school curriculum and learning approaches, in these two spheres of the schooling system, should be responsive to and validate emerging and evolving literacies as practised by young users – young learners – as imaginative drivers and game changers of the literacy evolution.

Against this backdrop, the paper, first, presents an overview of the existing literacy orthodoxies and some of the emerging permutations of these orthodoxies. Second, it delineates the way in which semio-technologies help mediate emerging and evolving literacies within the ambit of interface theory. Third, it outlines the ways in which schools can reimagine their literacies curricula and their literacies pedagogy. Fourth and last, the paper characterises the changing nature of learners and the changing roles of teachers in the light of digital literacies.

Existing literacy orthodoxies

Throughout its evolutionary trajectory, literacy has mutated and undergone definitional shifts. All of these mutations and definitional shifts have to do with the theorisation of literacy as a concept that resonates with how literacy itself is viewed in a given period. This implies that these evolutionary mutations and shifts of literacy are largely informed by the process of periodisation. The latter refers to time frames through which a concept or practice is understood and represented in given designated periods with a view to mapping out how it develops within these designated historical trajectories. The case in point here is that in one given time duration (e.g. during the mid-20th century), literacy was understood to be, as pointed out by Johnston (2010), the ability to read, to write, to speak, and to listen (cf. Schleicher, 2012; Summey, 2013). During this period, this view became the dominant understanding and thus, the dominant definitional orthodoxy of literacy. Another case in point relates to the late part of the twentieth century and the early part of the twenty-first century when, thanks to the rise of the discourse of skills, literacy came to be associated with acquiring a set of skills (e.g. reading, writing, speaking and listening skills, and information literacy skills) which are measurable and testable (see Johnston, 2010; Schleicher, 2012). Similarly, then, this became the dominant view of literacy which, in turn, became the dominant conception of literacy. One common feature of these two definitional orthodoxies is their one-dimensional, cognitivist and instrumentalist view of literacy. Literacy came to be
equated with a language facility and with skills – an emphasis on phonemic awareness, comprehension and fluency (Perry, 2012) – on the one hand; and as a concept entailing a single practice, and not plural practices and plural literacies, on the other.

Another apt analogy to capture the evolution of literacy is through Goodwin’s (2016) three digital ages: pre-digital age, mid-digital age and post-digital age. The first age was a time characterised by devices or technologies that had one main function and that were understood in a one-dimensional way. Examples are radio, TV, recorded music, newspapers and magazines, each of which existed as a silo and for itself. They were all viewed discretely. This age corresponds to the period when literacy was conceptualised discretely as the ability to read, to write, to speak, and to listen. The second age is, according to Goodwin (2016), a period straddling the time from when digital was being accepted as part of the mainstream, to the time when digital became fully immersed into the everyday life of our society. It is epitomised by digital card payments. This mid-digital age resonates with the time when literacy was dominated by the skills discourse, while at the same still being perceived to be the ability to read, to write, to speak, and to listen. The third age is the era in which digital technologies (and devices) form a seamless backbone of our everyday lives, and operate silently in the background, as is the case with the Internet, instant messaging, and live-streaming in most societies today. This sees an unnoticeable conflation of mobile and desktop, online and offline, and physical and virtual (see Goodwin, 2016). It is the age that is characterised by a blurring between instant messaging and writing and speaking, between watching TV and YouTubing, and between Spotifying and Netflexing.

Moreover, literacy as both a concept and a social practice has seen a typology of orthodoxies. Examples of the recent orthodoxies include, among others, the following: critical literacies; New Literacy Studies (NLS); new literacies; multiliteracies; multicultural literacies; pluralistic literacies; globalised literacies; multimodal literacies; digital literacies; adolescent, transitional and emergent literacies; mobile literacies (cf. Chaka, 2009, 2010c; Cope & Kalantzis, 2013; Summey, 2013). Eight of these orthodox literacies are briefly discussed here. The term, critical literacies, is associated with critical traditions, the three most important of which are critical pedagogy, critical language awareness and critical discourse analysis. The roots of the first tradition can be traced to the critical educational teachings of a Brazilian literacy theorist, Paulo Freire, while the last two critical traditions have their roots in the work of Norman Fairclough, among other scholars (see Russell, Lea, Parker, Street, & Donahue, 2009). In this sense, critical literacies involve not only the ability to read and write critically (and to listen and speak critically), but also the ability to decode and manipulate texts, discourses, genres and practices. Moreover, they entail the capabilities to engage with sophisticated and multimodal texts, discourses and genres, and the manner in which such texts, discourses and genres (re)position reader subjectivities. This includes unpacking the attendant social and cultural conditions under which texts, discourses and genres are (re)produced (Miller, 2015). Furthermore, critical literacies challenge and critique skewed power and ideological relations and the (mis)construction of realities with a view to unmasking or transforming them (Andreotti, 2014; Johnston, 2010; Shor, 1999; cf. Rutten, Rodman, Wright, & Soetaert, 2013). In a nutshell, critical literacies are literacies for self-empowerment and for self-emancipation qua critical pedagogy.

New Literacy Studies (NLS) is a composite work (theoretical and research work) credited to the New London Group. This composite work represents a new perspective on literacy, and de-emphasises the conventional, instrumentalist skills-acquisition angle of literacy associated with classical literacy approaches. Instead, it foregrounds literacy as a social practice, and theorises it as multiple literacies that change across time and space, but which
are implicated in power relations. The theorisation of multiple literacies as changing across time and space resonates with the idea of periodisation posited in this paper, and corresponds to Forzani and Leu’s (2017) view that literacy is deictic, a view which centre-stages how literacy is contextually embedded and technologically driven (also see Andersson & Hashemi, 2016; Burnett, 2016; Kulju, Kupiainen, Wiseman, Jyrkiäinen, Koskinen-Sinisalo, & Mäkinen, 2018; Leu, Kinzer, Coiro, Castek, & Henry, 2017). Additionally, NLS problematises notions such as literacy, and dominant versus marginalised or resistant literacies (Street, 2003; also see Lea, 2004). The theoretical framing of NLS is informed by three related schools of thought: systemic functional linguistics, critical discourse analysis, and cultural anthropology (Lea & Street, 1998).

For their part, new literacies are intrinsically linked to the NLS paradigm: they are one variant of this paradigm that embodies its newness flagship label. The adjective new encompasses two senses when applied to literacies: paradigmatic and ontological senses. The paradigmatic sense of new literacies entails a new alternative (especially a new socio-cultural approach) to conceptualising and theorising literacies that markedly departs from traditional models of literacies rooted in psycholinguistics. In this way, it signifies a new paradigm that positions itself differently from existing orthodox approaches to literacy (Lankshear & Knobel, 2011; cf. Andersson & Hashemi, 2016; Burnett, 2016; Farrell & Corbel, 2017; Rutten et al., 2013). The ontological sense of new literacies relates to new technologies and the multiple ways in which these technologies uniquely mediate literacies as opposed to the manner in which conventional literacies are encoded. This ontological sense has two dimensions to it. The first dimension is about the rapid rise of digital-electronic technologies (in a global era and in a global world) and the attendant post-typographic forms and production of texts that involve composite multimodal forms of texts (e.g. text, images, icons, sound, animations and video). The second dimension of the ontological sense speaks to the ethos of new literacies: that is, in contrast to conventional literacies, new literacies are often more collaborative, more participatory, and more distributed. The converse is true here: they are less published, less author-centric, and less individuated (Lankshear & Knobel, 2011). This second dimension of the ontological sense of new literacies has more to do with the zeitgeist of these forms of literacies.

On this score, multiliteracies, like new literacies, are rooted in the NLS paradigm; they are another flagship variant of this paradigm that emphasises the multiplicity of literacies and serves as a departure from the singular conceptions of literacy. As a notion, multiliteracies redefines texts and practices as having more to do with emerging multiple literacies than with conventional singular literacies. And as an approach, it is intended to re-theorise and accommodate the diverse modes through which texts and meanings are realised and encoded in the increasingly globalised information-rich world. Some of the diverse modes through which texts and meanings are exchanged and encoded are: written, oral, visual, audio, spatial, gestural, behavioural, tactile modes (see Andersson & Hashemi, 2016; Cope & Kalantzis, 2013; Kulju et al., 2018; Mills, 2016). Allied to this is that meaning making involves representational, social, structural, intertextual and ideological domains. The diverse modes for exchanging and encoding meaning, and the diverse domains for meaning making reflect the multimodality embedded in the notion of multiliteracies. Moreover, multiliteracies take cognisance of the fact that the world in which literacy users live, is multilingual. This idea of multilingualism and multimodality adds to the two multi- dimensions of literacies (Cope & Kalantzis, 2013; Miller, 2015; cf. Leander & Boldt, 2012; Perry, 2012).

In line with the forms of literacies delineated in the preceding paragraphs, multicultural literacies involve complex literacies intertwined with and embedded in social and cultural
practices. They relate to a multitude of people coming from diverse nations, countries, races, ethnicities, cultures, languages and religions. These literacies play themselves out when peoples from these diverse backgrounds do any of the following: (1) speak, write, communicate, think, act (cf. Miller, 2015), and play in any given settings; (2) learn, interact, and socialise in given settings; (3) participate in and observe different social, cultural and religious practices and activities; and (4) raise children in diverse family settings. Multicultural literacies need to be treated and approached circumspectly as some social and cultural practices are culturally implicit and culture-specific. For instance, Boivin (2016) talks of three types of multiliteracies that she argues are characteristic of three transnational Gorkha and immigrant Nepalese families she investigated in the United Kingdom. These are: transnational cultural multiliteracies; global cultural multiliteracies; and peripheral ritualised multiliteracies.

Related to multicultural literacies are pluralistic literacies. The latter subsume a number of cognate and disparate literacies: basic, local, functional, vernacular (Chaka, 2009; cf. Lee, 2011), youth/adolescent, adult, family, urban/ rural, migrant/immigrant, and transnational/border literacies (cf. Boivin, 2016; Lam, 2009; Lam & Warriner, 2012; Mills, 2016). Each of these composite literacies refers to and represents the domain after which it is called, even though each domain may comprise variant literacies unique to its respective users. For example, there are heterogeneous and plural youth/adolescent, adult, family, urban/rural, migrant/immigrant literacies at any given time within the same local domains, and across similar global domains. This implies that youth/adolescent literacies of the youths or adolescents in Soweto are not only plural for different groups of youths and adolescents in Soweto, but also do vary from group to group in this domain. In this instance, such literacies are incomparable to and incommensurable with youth/adolescent literacies of youths/adolescents in Cape Town, Accra or New York.

Furthermore, there are globalised literacies. Following Chaka (2009), the main drivers of globalised literacies are the knowledge economy, new technologies, new twenty-first century skills, new multimedia texts, emerging social and cultural contexts, emerging citizenship, trans-nationalities, and global capital. They encompass all literacies in the late modernity that have a globalising effect on the different spheres of human existence, and that characterise every aspect of today’s knowledge-based society. Overall, globalised literacies have to highlight, engage, unpack, interrogate and understand practices and tendencies that lead to globalisation.

Lastly, digital literacies emanate from the increasing digitisation of the different facets of our human lives as driven by:

- Diverse hardware consumer devices (e.g. laptops, smartphones, tablets, phablets, iPods, iPads, game consoles and MP3/MP4 players)
- The Internet
- Voice over the Internet Protocol (VoIP) technologies (e.g. Skype)
- Social media technologies, social networking sites, or online participatory media platforms (e.g. Facebook, Twitter, LinkedIn and Pinterest)
- Text messaging, and over-the-top (OTT) or instant messaging technologies (e.g., WhatsApp, WeChat and Moya Messenger App)
- Online media and file sharing platforms (e.g. Flickr, YouTube, Instagram and Slideshare)
- Web-based streaming technologies (e.g. video-on-demand, radio and TV (audio and video) streaming, YouTube and live chat facilities)
- Electronic reading devices or platforms (e.g. e-books, e-textbooks and e-readers)
- Virtual worlds (VWs) (e.g. Second Life, Active Worlds, and Project Wonderland)
- Massively multi-player online role-playing games (MMORPGs) (e.g. World of Warcraft, EverQuest I & II, Eve Online, The Lord of the Rings Online, City of Heroes/Villains, Age of Conan) (cf. Hobbs, Brown & Gordon, 2006; International Reading Association, 2009; Luskin, 2016; Miller, 2015; Wàn & Reddy, 2009).
- Cloud-based storage applications or sites (e.g. Google Drive, iCloud, Dropbox and OneDrive)
- Web-based documents (e.g. Google Docs and Windows Web Apps).

The digitisation of different aspects of our human lives – including the digitisation of literacies – has been driven and enabled by the successive epochs of the digital revolution. Figure 1 vividly depicts these successive epochs of the digital revolution through an infographic:

Figure 1 An infographic depicting the successive epochs of the digital revolution from 1947 to the present day (Source: Science & Technology Facilities Council, n.d.).

Digital literacies have been shaped by and responsive to digital technologies that were invented or that emerged in each digital revolutionary epoch. Some of these digital technologies are the ones that this paper refers to as semio-technologies. The infographic is, of course, not exhaustive as some of the technologies such as: blogs; Wikipedia (and wikis); virtual worlds; live-streaming; cloud computing; augmented reality; Twitter; LinkedIn; the
Semio-technologies, interface theory and imagination: mediating literacies

In a world in which literacy can no longer be singularised without undercutting its multifaceted and heterogeneous nature, and in which diverse technologies have become so pervasive in our everyday lives, two things are indisputable: the colonisation of our everyday life worlds by technologies; and the disruptive nature of technologies. Most importantly, the colonising and disruptive effect of technologies is even more evident and relevant in the arena of literacies. And in our age, more than at any other time, the relationship between technologies and literacies is, the paper contends, both dialectical and deterministic: technologies are as much implicated in and determined by literacies as literacies are by technologies. Even though this seems to border on the deterministic – not least technological determinism – it nonetheless does not, as both technologies and literacies are appropriated by human users, and not the reverse. This is more so with literacies: not only are they appropriated by users, but they are also indigenous to users with technologies serving as mediums mediating them (cf. Bocconi, Chioccariello, Dettori, Ferrari, & Engelhardt, 2016; International Reading Association, 2009; Johnston, 2010; Knobel & Kalman, 2016; Kulju et al., 2018; Meltzer & Hamann, 2005; Summey, 2013).

In their original sense and as used by Langlois (2011), semio-technologies refer to a constellation of techno-cultural assemblages working through and using signs to mediate, configure and translate data, information and linguistic symbols. They also refer to the interplay between representational technologies, language, cultural practices, and non-linguistic, informational processes mediating plural online communications. Moreover, they constitute composite processes through which meanings can be mediated and managed on participatory media platforms (cf. International Reading Association, 2009; Langlois, 2014; Summey, 2013).

Furthermore, they establish and modulate parameters within which meanings (regimes of meanings) can be produced and circulated, and within which the relationship between language and the world can occur. In all, semio-technologies are new communication technologies and social software technologies. They also include the fourth industrial revolution (4IR) technologies – also referred to as digital exponential technologies (see Mohanty,
– like infinite computing, artificial intelligence (AI), machine learning (ML), robotics, bots, AI assistants, and other related algorithmic technologies (see Penprase, 2018; Peters, 2017; Shorey & Howard, 2016), which mediate our lives so we are more involved with our world, more in touch with those in our lives, and more knowledgeable about ourselves and others around us (Langlois, 2011, 2014). Overall, Langlois’s work draws on different disciplinary fields such as semiotics, critical theory, relational psychoanalysis, post-Fordist theory and software studies to theorise practices of meaning making as encoded by semio-technologies. Her semio-technologies are machines or media technologies for making meaning (Langlois, 2011, 2014).

And, with the advent of the 4IR, semio-technologies have the potential to make the world in which we live a placeless space characterised by deictic literacies. For example, one instance of literacy spawned by the 4IR is data literacy (see Morrow, 2018), which has to do with the big data that is one of the critical features of 4IR technologies such as AI, ML and computerised algorithms. Big data also has to do with analytics. As there are different big data sets generated through AI, ML and algorithms, it is appropriate to talk about data literacies – and not just data literacy in a singular form as suggested by Morrow (2018) – as one form of literacy that the 4IR era has added to the literacy landscape. To this end, Burnett (2016) argues that, in our age, data has become digitised, thereby leading to the datafication of school and pupil performance, in the process (cf. Williamson, 2016). One could add that the era of the 4IR holds the prospect of the datafication of all facets of our human lives. Hence, the importance of data literacies becomes unavoidable for literacy practitioners and scholars. But scholars such as Farrell and Corbel (2017) go even further to claim that in the 4IR era – what they refer to as Industry 4.0 – the skills and literacy needed are Skills 4.0 and Literacy 4.0. While the naming of skills and literacy by Farrell and Corbel (2017) reflects a throwback to the era of Web 1.0, Web 2.0 and Web 3.0 (see Chaka, 2010d), their conceptualisation of Literacy 4.0 has three interlinked angles to it: the individual, the social and the material aspects of literacy. To this end, they argue that:

When we talk about literacy in this paper we use the term to mean **appropriate engagement with texts**. Texts are manifestations of symbolic systems. These symbolic systems may be alphabetic, numeric, pictorial, visual, aural, or combinations of these (p. 10, original emphasis).

In the context of this paper, semio-technologies are used both in their Langlois (2011, 2014) sense and in their 4IR orientation in relation to literacies. This means that they are seen as both individual and composite technologies – both at the hardware and software levels – in which everyday lives are immersed, and through which everyday personal, social, cultural and educational practices and needs are mediated on a twenty-four hour basis. They are also technologies that mediate not only many and varied literacies, but also the many and varied meanings associated with those literacies. These technologies can be indispensable to daily existence in varying but complementary degrees, with some (e.g. mobile phones or smartphones and tablets, and game consoles for digital gamers) more indispensable than others (e.g. desktop computers). Again, as highlighted in the first section, some of the semio-technologies are more indispensable to certain types of users than they are to others, while others are not. The same applies to social software applications or online social networking sites such as Facebook, Twitter, WhatsApp, WeChat or Moya Messenger App. Additionally, as mentioned earlier, some of the semio-technologies are domain-specific (can be used in certain domains), while others are domain-neutral (can be used across domains).
Against this backdrop, the paper argues that semio-technologies are better positioned to mediate all of the instances of literacies (and the semiotic practices attached to them) delineated in the preceding section than when users engage in any of these literacies on their own without leveraging these technologies. This is more so as they are, on the one hand, portable, pervasive and ubiquitous; on the other hand, they are not temporally, spatially and geographically bound. This means that while literacies not mediated by semio-technologies are inherently constrained by mobility, time, space, and geography, literacies mediated by semio-technologies are not subject to any of these constraints. In this regard, two points warrant mentioning. First, semio-technologies help users tap into mobile and digital literacies. Second, semio-technologies tend to offer users more affordances in terms of tapping into a constellation of literacies than users can without them. Thus, while Langlois’s (2011, 2014) semio-technologies are machines or media technologies for making meaning, the semio-technologies proposed here are technologies for mediating literacies and their attendant meanings.

The preceding discussion leads to the notion of interface theory. Classically, interface theory can be traced to computational and software studies, and to interface design and behavioural cognition (Drucker, 2011, 2013). It relates primary to graphical user interface or user interface, on the one hand, and to reading and human processing, on the other. The idea of user interface refers to the interface based on graphics (icons, pictures and menus) instead of text, and to the use of a mouse and a keyboard as input devices. Framed differently, it is as much about how the user relates to, interacts with and accesses computing devices as it is about denoting the space existing between the user and computing devices. The theory used to conceptualise interface, and the aspects related to it in an interface environment, is referred to as interface theory.

The picture painted in the preceding paragraph leads to the analogy of the interface theory mentioned in the first section. This relates to the interface between users and literacies, and between users and digital technologies through which literacies are mediated. In this interface setup, users (humans), digital devices (non-humans), and literacies (non-humans) interact as a collective. A collective, according to Latour (2005), is a collection of human and non-human actors interacting with each other in a virtual network scenario (also see Kopeć, 2016). Similarly, in the case of semio-technologies, users, digital devices and literacies (including software programmes and computer networks) interact with each other as actors through an interdependent relationship in a virtual interface.

But there is a humanities approach to interface theory articulated by Drucker (2011, 2013) that is relevant to this paper. At the basic level, Ducker points out that a book, a newspaper page, a web page, and an ATM are all instances of an interface, to varying degrees. On this basis, she argues that an interface does not so much refer to a between space as it does to the environment mediating multiple and complex user experiences. Furthermore, she points out that in the world of digital technologies, interface refers to an environment comprising a multiplicity of worlds, phenomena, representations, and media modalities (Drucker, 2011). It is this humanities approach to interface theory, simplified as it is here, that is relevant to the notion of literacies. That is, through this theorisation of interface, the paper argues for three-pronged notion of interface: the interface between users and their semio-technologies; the interface between users and the literacies they are offered by semio-technologies; and the interface between semio-technologies and literacies. Interface, in this sense, is a constitutive complex environment. In it, users engage in literacy practices as situated, embodied and inscribed subjects whose literacies are enacted through affordances offered to them by their respective semio-technologies.
The last aspect in this section is imagination. The latter is central to users, their literacies and their semio-technologies. Emphasising the centrality of words and thought in providing an avenue to imagination literacy, Johnston (2010, p. 13) avers that: ‘access to layers of words is access to layers of thought, and access to layers of thought helps breed the literacy of the imagination’. For this paper, access to a constellation of semio-technologies is access to intricate practices of literacies, and access to the latter provides access to a vista of literacies of the imagination. One case in point that requires imaginativeness is data literacies as referred to earlier. Another case in point would be analytics literacies and algorithms literacies especially in the age of AI and ML. Again, following Johnston (2010), growing one’s imagination breeds one’s modes of thinking. Analogously, when users are imaginative enough in the way they use their semio-technologies in their everyday lives with a view to engaging in multiple practices of literacies, they further help stimulate their own modes of thinking and imagination. In this instance, imagination serves as the engine centre of human thought and human creativity, and this since time immemorial. To this effect, Schleicher (2012, p. 34) aptly captures the deictic, imaginative, and many and varied uses of literacy in the twenty-first century (our time):

In the 21st century, literacy is about reading for learning, the capacity and motivation to identify, understand, interpret, create and communicate knowledge, using written materials associated with varying situations in continuously changing contexts. In the past, it was sufficient to direct students to an encyclopedia to find the answer to a question, and they could generally rely on what they found to be true. Today, literacy is about curiosity and self-direction, managing non-linear information structures, building one’s mental representation and synthesis of information as one finds one’s way through hypertext on the Internet, about dealing with ambiguity, developing healthy scepticism, an inquiring mindset, and interpreting and resolving conflicting pieces of information (original italics) (see also Bermingham, 2018, n.p.; Burnett, pp. 19 & 28; International Reading Association, 2009, n.p.; Summey, 2016, p. 6).

Unfortunately, the use of imagination seems to fly in the face of many of the western education systems that tend to shun imagination from the realms of their curricula (see McCaw & Paterson, 2011; cf. Robinson, 2011). In fact, McCaw and Paterson (2011) decry the decline of imagination in current education systems, and argue that this decline lies at the core of fractured literacies, which is a reference to the disjointed nature of literacies.

Re-imagining literacies curriculum and literacies pedagogy for schools

In view of the points raised and discussed in the preceding sections, the paper makes two related proposals. First, educational curricula for schools need re-imagining and have to incorporate the literacies that have currency in a given age, or literacies in their deictic sense. Second, pedagogies at school level need to embed and to respond to the prevailing literacies in their practices. The rationale for these two proposals is that literacies are embedded within disciplines, while at the same time they span and straddle disciplines. That is, they are intra-, inter- and transdisciplinary (see Hague & Payton, 2010). In fact, Berge’s (2017, p. 6) assertion about ‘a transversal competence fundamental for learning and for demonstrating competence in all subjects’ in relation to the digital competence required of the Norwegian K-12 school curriculum, has more relevance here. Using the analogy of Gibbons, Limoges, Nowotny, Schwartzman, Scott, and Trow’s (1994) two modes of knowledge production – Mode 1 and Mode 2 – disciplinary literacy knowledge (Mode 1) is
Homogeneous, hierarchical, and linearly formulated and retained, whereas transdisciplinary literacy knowledge is heterogeneous, heterarchical, and non-linearly transient. Literacies include both modes of knowledge representation; they are part of disciplinary and cross-cutting disciplinary knowledge representation (cf. Hague & Payton, 2010).

Therefore, this is what schools should bear in mind in their approach to and in their treatment of literacies. They also need to take into account that literacies and their associated literacy practices are not neutral and autonomous. Rather, they have heavily loaded multiple meanings (technological, digital, personal, social, material, cultural and ideological meanings) (cf. Farrell & Corbel, 2017; Leu et al., 2017; Forzani & Leu, 2017; Kulju, 2018; Penprase, 2018; Summey, 2013) embedded in them. So, every time users engage in literacies, those literacies embody and mediate such meanings. While the other six forms of literacy meaning are self-explanatory, the material form of literacy has to do with, as Farrell and Corbel (2017, p. 10) contend, understanding literacy as it relates 'to physical and virtual objects, from paper and screens … through to games, social media and interactions with robotic systems...' In this context, one form of literacy related to virtual gaming, especially MMORPGs, is meta-gaming, which Chaka (2010b) argues constantly shifts from in-game conversations to out-game conversations.

Young people – more than adults – are the prime drivers and influencers of evolving literacies because of their digital savviness and their perennial existence in digital environments. That is, they play a disruptive and game-changing role is as far as the evolution of literacies is concerned. This is particularly so when it comes to semio-technologies as prime technologies for mediating literacies. There are three models that schools (both primary and secondary) can consider for embedding literacies into, and for making literacies part of their curricula and pedagogies: standalone, infusion and cross-cutting models. First, the standalone model at the primary school level requires that the rudiments of the essential and relevant literacies that are in currency be made part of the curriculum in the beginning and lower grades. These elementary literacies, in particular elementary digital literacies, can be packaged as a standalone examinable learning area. They then need to comprise multimodal texts (e.g. text, images, icons, sound, animations and video), or consist of texts configured in written, oral, visual, audio, spatial, gestural, behavioural, and tactile modes (cf. Andersson & Hashemi, 2016; Cope & Kalantzis, 2013; Kulju et al., 2018; Miller, 2015; Mills, 2016; Walsh, 2010). Presented as a standalone learning area in this way, these elementary literacies constitute Model 1 disciplinary literacy knowledge in which learners get to acquire and master the basics of literacies.

Second, the infusion model entails infusing elementary literacies into the existing learning areas, and teaching them organically as part of learning areas at the primary school level. This means packaging elementary literacies that are in currency, and embedding them into the existing learning areas for two reasons: to inform and enhance the existing learning areas; and to establish the necessary link between these elementary literacies and the existing learning areas. This will require that primary school pedagogical practices foreground this infusion, and that assessment procedures take this infusion into account as well.

Third, the cross-cutting model involves apportioning elementary literacies a space in each of the existing learning areas – so they can be taught as an integral part of these learning areas. This model is synonymous with the concept of literacies across disciplines. It also resonates with Berge’s (2017) transversal competence mentioned earlier. If presented in this manner, these elementary literacies will constitute Model 2 transdisciplinary literacy knowledge in which learners get to acquire and master the heterogeneous, heterarchical and
non-linear basic literacies in line with given learning areas. Most significantly, elementary literacies to be taught at his level should not only be in currency; they should also be the ones that will help learners seamlessly transition into the secondary school level literacies. So, in the main, they will have to be preparatory and transitional literacies. Moreover, on the pedagogical realm for all the three models, requisite approaches such as self-discovery, action learning, experiential learning, and experimental learning will have to be some of the key ingredients of the teaching and learning enterprise (cf. Chaka, 2010a, 2010b, 2012).

The scenario for secondary school literacies curriculum and for secondary school literacies pedagogy is similar to the one sketched above. However, there are certain points of departure related to the types of literacies to be offered and curriculated, and to be embedded into the pedagogy at this level. For instance, at the secondary school level, actual and relevant literacies that are in currency, and that are responsive to the literacy needs and demands of this level, are the ones that need to be curriculated and taught. Two examples of such literacies are digital literacies and high literacy. The latter, in the context of this paper, will be high literacies in a plural form. High literacy is, according to Tucker (2016, n.p.):

the ability to relate well to many kinds of people from many different backgrounds and to communicate with them, the ability to see patterns others don’t and to use them to produce original insights that facilitate the solutions to new problems and open the way to new frontiers.

They, too, have to incorporate multimodal forms, but in a more complex manner that is commensurate with this level. These literacies may include: multimodal literacies; participatory literacies, multiliteracies; multicultural literacies; pluralistic literacies; globalised literacies; mobile literacies; and data literacies. As is the case with elementary literacies, all these many and varied literacies need to be packaged in a way that will help learners transition into the different streams of post-secondary education such as technical vocational education and training (TVET) colleges and higher education institutions (HEIs). All of these literacies need to be taught and acquired within a T-shaped curriculum that has the potential to produce T-shaped learners (see Duros, 2013; Medhat & Peers, 2012; Tucker, 2016) who are ready to confront the rapidly changing world. A T-shaped curriculum is interdisciplinary and cross-cutting; it enables broad and deep learning, and is futuristic in nature. It combines imagination, experience and content knowledge with literacies and personal attributes (e.g. behaviours and attitudes) (see Duros, 2013; Medhat & Peers, 2012; cf. Pink, 2006).

One indispensable requirement for learners at this level is that they ought to be provided with or allowed to use relevant semio-technologies so that they can access and mediate the literacies on offer, and so they can participate in related literacy practices and in associated meaning making practices. Such semio-technologies can be part of a bring-your-own device (BYOD) approach in which learners bring their own mobile devices to school, or can be offered such devices along the lines of the Gauteng province’s paperless classroom model. Alternatively, they can be obtained using a combination of these two deployment approaches. Furthermore, some of the requisite learning approaches that can be employed at the secondary school level, in addition to those mentioned under the primary school level, are: situated learning; social learning; presence learning; connectivist and distributed learning; neo-millennial and emergent learning (see Chaka, 2010a, 2012; Chaka, Nkhobo & Lephala, forthcoming)
Changing learners and changing teacher roles

The advent of ever-evolving literacies has led to new and changing learners. Most of these learners are digitally savvy: they are able to use multiple semio-technologies either at school or out of school. In this case, they: Facebook; tweet; listen to music, and watch videos over their own mobile phones; text and instant message; play online games; and surf the Internet for a variety of reasons. In addition, they socialise and make new contacts online; produce and remix content; create their own pictures and Photoshop them; and download and upload material online. All of these activities bring learners closer to multi-tasking, making it difficult to get their attention on anything else other than their gadgets. The scramble to get learners’ attention (which is at such a premium) on mundane learning matters has enormously increased, and the scarcity of this attention has resulted in the so-called attention economy which contrasts with the literacy of attention (cf. FamPlan, 2018; Lankshear & Knobel, 2011; Vie, 2008).

Consequently, these changing learners have impacted on the traditional roles of teachers. Teachers, then, are expected to be:

- Enablers of literacies
- Facilitators of literacy practices
- Patrons of digital natives and learners’ communities of practice
- Mediators of the collective intelligence of learners
- Enablers of the different types of learning approaches that enhance the many and varied literacies
- Initiators of literacy innovation and creativity

Conclusion

Ever-evolving contemporary literacies call for a constant re-imagining of how literacies can be embedded in the school curriculum, and how such literacies can be taught in a way that does not privilege some literacies over others. They also bring into sharp focus, which literacies are to be curriculated and taught, and why, and which ones are not to be. Moreover, they call for a continual re-imagining of pedagogical practices and the attendant learning approaches. In view of this, the current paper has explored and re-imagined literacy in two ways: first, by reconceptualising it in its plural form as literacies; and second, by situating it within the framework of semio-technologies. Employing interface theory, it has argued that imagination serves as an anchor point for literacies, semio-technologies and literacies pedagogy. In addition, the paper, has argued that in its plural form, literacy encompasses a variety of literacies: critical literacies; New Literacy Studies; new literacies; multimodal literacies; participatory literacies; multiliteracies; multicultural literacies; pluralistic literacies; globalised literacies; digital literacies; mobile literacies; data literacies; and high literacies. Furthermore, the paper has proposed how, following three models (the standalone, infusion and cross-cutting models), literacies can be curriculated and taught at both primary and secondary school levels. Finally, it has characterised the changing nature of learners and the changing roles of teachers in line with ever-evolving literacies.
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