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What's to be learned?

A Review of Sociocultural Digital Literacies Research within Pre-service Teacher Education

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ABSTRACT

This circumscribed review analyzes recent sociocultural, qualitative research in digital literacies within pre-service teacher education. It focuses on what teacher educators are doing with respect to working with pre-service teacher education students and digital literacies conceived more in terms of social practices than as proficiency in using education technology tools. Analysis suggests digital literacies within pre-service teacher education are typically linked to out-of-school practices in order to help facilitate student teachers' take-up of digital literacies in their own classrooms. The studies also suggest that projects that encourage and support collaboration are well received by pre-service teachers and seem to result in fruitful learning.

Keywords

Digital literacies, Pre-service teacher education, Review

INTRODUCTION

Digital literacies and teacher preparation—or, in this paper, pre-service teacher education—programmes in universities are receiving increased attention from policy-makers, curriculum writers and academic researchers. Faculties in universities are being called on to combine literacy and digital technologies in teacher education students' coursework in ways that are meaningful and that will transfer effectively into innovative teaching and learning practices in school classrooms. Indeed, international policy pronouncements and guidelines, such as UNESCO's *ICT Competency Standards for Teachers* (2008), point to large-scale expectations that teacher education fall into step with digital technology developments and uses in the wider world. The competency standards in this UNESCO document were to

serve as guides for all teachers, but focused especially on teacher education programs and their role in developing “technology capable students” (UNESCO, 2008, p. 1). Coalition and national policy responses have certainly echoed this refrain (e.g. the Organization of Ibero-american States’ pronouncement on technology and education—see Carneiro, Toscano, & Diaz, 2008; the UK’s Joint Information Systems Committee and the UK Open Educational Resources program’s “Digital Futures in Teacher Education” study—see Gruszczyńska, Merchant, & Pountney, 2013; the national “Habilidades Digitales para Todos” and “Mi Compu MX” programs in Mexico—see Kalman, Hernández Razo, & Rendón Cazales, 2016). Brazil—the home country of the first author—is an interesting example of how some countries are responding to these calls and expectations. In 2008, for instance, the national Broadband Internet School Program was implemented to ensure internet connections for schools, and in 2010 the One Laptop Computer per Student Program was put in place. Around the same time, the National Pre-service Brazilian Teacher Education Program (Programa Institucional de Bolsas de Iniciação à Docência—PIBID, 2008) was instituted, and its aim is to increase the number of qualified teachers in Brazil and improve the quality of teacher education in general by means of innovative teaching at the university and school levels. These kinds of teacher education reforms and digital technology developments pushes resonate with developments and initiatives in other countries.

The policies and initiatives described above are a response to the spread of digital technologies throughout the world which have ushered in different affordances, opportunities and constraints related to our ways of being, doing, thinking, meaning, and relating. From the 1990s onwards, significant shifts in how people accessed information and communicated with each other brought about by digital technologies and networks generated the idea and practice of *digital literacy*. Initially, this concept focused on a specific set of skills and competencies that would qualify the individual to be considered “literate” (cf. discussions in Gilster, 1997). Subsequently, however, digital literacy has been taken up within fields informed by social and cultural theories to focus on digital literacies (in the plural) as a set of sociocultural practices, and not a checklist of proficiencies or competencies (Lankshear & Knobel, 2008; Jones & Hafner, 2012; Thorne, 2013; Knobel & Lankshear, 2017). In addition to the growing digitization of everyday life, we have also witnessed widespread introduction of internet-based learning and course management activities in higher education, since the late 1990s (Guri-Rosenblit, 2009; Kirkwood & Price, 2005, 2013). This makes examining digital literacies research within pre-service teacher education programs an interesting aim (see similar attention in initiatives like: jisc.ac.uk; Gruszczyńska et al., 2013). As such, this review aims at contributing a map of sorts regarding recent sociocultural studies of digital literacies and pre-service teacher education around the world. It has taken 2008 as the starting point in recognition of major policy and project initiatives in Brazil with respect to teacher education and digital technologies. The authors believe this paper might inform local efforts in Brazil and other countries like Brazil, which have relatively “young” national teacher education reform and digital technology development policies and initiatives in place. As such, the following research question guides this analytic review: What does the qualitative, sociocultural research literature over the past seven years (2008 to 2015) say about the ways in which pre-service teachers’ digital literacies are being addressed within teacher education programs?

FRAMING LITERATURE REVIEW

This analytic review is located deliberately within a sociocultural conception of new literacies, which are understood as new, differentiated ways of making and sharing meaning about the world. Within this orientation, meaning-making extends well beyond the written word to encompass different purposes for: communicating; new and different media for meaning-making; and diverse social contexts and practices in which meanings are made and shared. Accordingly, the deliberate use of the word “literacies” in the plural, together with the modifier “new,” is used to signal a theoretical and pragmatic shift away from past conceptions and practices of “literacy” in educational settings that focused exclusively on alphabet-based reading and writing. The latter was challenged directly in the 1970s with the development of the understanding that not everyone was able to read or write specific kinds of texts just by knowing how to read and write (Menezes de Souza, 2011). As a result, a new conception of “literacy” and what it means to “be literate” arose, one that recognized different ways of reading and writing (and speaking, listening and viewing etc.), that went well beyond written texts, and which was couched within practices that are expressed and enacted differently according to the varied communities and contexts in which they take place (Lankshear & Knobel, 2006; Gee, 1996; Lankshear, 1987; Street, 1984).

This conception of literacies recognizes them as fully embedded within social *practices* (Lankshear & Knobel, 2011; Thorne, 2013; Gee, 2008). The idea of practice here relates to “socially structured, and socially structuring, patterns and resources that form the core of everyday life activity [...] [That is,] ways of understanding and doing things in the world” (Thorne, 2013, p. 193). For example, writing a travel blog for budget travellers is quite different to remixing video clips to create spoof movie trailers. Both practices entail knowing different content, knowing different things about what counts as “good” or appropriate within the practice (e.g. recommending an expensive luxury resort on a budget travel blog makes no sense; creating a remixed movie trailer that has no appealing storyline of its own won’t be popular), and being able to use different meaning making affordances, such as tools, shared knowledge, networks, relationships, and so on, in ways that are socially recognized as being part of the particular practice.

It is within this new literacies milieu that we locate *digital* literacies, which emphasize literacy practice within the digital world (new literacies are not necessarily digital; digital literacies always are; see, for example, Cervetti, Damico & Pearson, 2006, p. 381–2). In thinking about digital literacies, it is useful to draw on Lankshear and Knobel’s (2011) distinction between new technical stuff and new ethos stuff. The first refers to the digital codes and devices that form new literacies’ technical foundations. The second relates to how participatory, collaborative and dispersed these new digital literacies are. Therefore, they typically are more social and less individual in terms of publishing and authorship when compared to traditional literacies. Thus, to reiterate, digital literacies are more than just a single set of technical skills and this understanding “complexifies and contests the notion of literacy as primarily a brain-local skill involving an individual engaged in deciphering and producing graphically rendered language” (Thorne, 2013, p. 193).

In this review, we connect this conception of digital literacies to pre-service teacher education because it is important for teacher educators to help prospective teachers really understand what digital literacies entail (and how they account for much more than a checklist of competencies) so that classroom teaching is indeed in step with the world outside the classroom. This analytic review, by focusing on digital literacies and pre-service teacher education, aims to find out what the qualitative, sociocultural research literature over the past seven years (2008–2015) has to say about the ways in which pre-service teachers' digital literacies are being addressed within pre-service teacher education programs.

METHODOLOGY

Initial selection criteria developed for bounding this review required the articles to be qualitative studies and published in English-language peer-reviewed journals between 2008 and 2015. Key education databases and indices were searched, and included: Google Scholar, EBSCO, ERIC, ProQuest and JSTOR. Search terms included: “sociocultural,” “practice*” (where the asterisk ensures a search for “practice” or “practices”), “digital literacies,” “student teacher*,” “teacher training,” “prospective teacher*,” “teacher education,” and “pre-service” or “preservice.” Studies mentioning digital literacies only in passing (e.g. as a list of items or as part of a bibliographic entry) were excluded. However, we found that our theoretical requirement (i.e. sociocultural) and focus on literacies (plural) meant that digital literacies were not the sole or sometimes not the principle term used in studies, and so we included papers that mentioned “digital literacies” only a number of times but *also* referenced or focused on “new literacies,” “multimodality,” “multiliteracies,” and digital technologies plus “literacy practices.” All four of these concepts are signal words for the particular sociocultural and literacy-focused orientation to digital literacies that this review is targeting (cf. New London Group, 1996). We emphasized qualitative studies in our search because of the anthropological turn in literacies research and its critique of literacy measurement research (cf. Street, 1984). As such, qualitative studies are the hallmark of literacies research, given the highly contextualized and cultural understandings wrapped up in studying these literacies (e.g. Street, 1984; Gee, 2008). That being said, three studies meeting our criteria employed mixed method designs (Ajayi, 2010, 2011; Hungerford-Kresser et al., 2012), but emphasized analysis of qualitative data, so were included. The seven-year limit to this review is deliberate and speaks directly to the first author's role as a teacher education professor in Brazil and her wish to understand digital literacies better in relation to her own teaching milieu. Admittedly, a seven-year spread in a review such as this is unusual, but we wanted to be sure to focus on studies that were unlikely to have informed and shaped the national Brazilian pre-service teacher education program (PIBID) that was launched in 2008 in order to focus on new developments—if any—to do with digital literacies and pre-service teacher education that might usefully inform the first author's project work with her own teacher education students or the wider teacher education milieu in Brazil. It must also be said that while there is a growing body of important homegrown research into digital literacies and teacher education (e.g. Junqueira & Buzato, 2013; Jesus & Maciel, 2015; Nasci-

mento, 2014), English language research remains a highly influential source of ideas and innovations within the Brazilian teacher education context.

For our purposes, studies focusing exclusively on digital literacy (in the singular) were excluded. While interesting, many of them foregrounded technology over literacy (casting literacy more in terms of competence than meaning making; see Lankshear & Knobel, 2008 and Røkenes & Krumsvik, 2014 for more on this). Similarly, we explicitly decided not to include new media or media literacy/ies studies either. This rich field draws on rather different theoretical traditions and serves related, but distinctly different, goals than literacy education does (see Jenkins 2010, for example). Both authors have certainly benefitted from looking to media literacies research for innovative ideas and insights. Nonetheless, we wanted to map the development of a *distinctly* literacies focused-research area within this larger milieu.

In the end, thirteen qualitative or mixed methods studies conducted in the US, UK, Canada, Australia and South Africa met our tightly-drawn selection criteria (see Table 1; studies are organized alphabetically). What struck us as we applied our inclusion and exclusion criteria was the large number of articles that were either descriptions of an experience or conceptual work, rather than a report of a research study. This small number of studies found suggests that research in this area remains a niche still to be filled.

Table 1. Summary of article pool.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Ajayi, 2010 USA	Alternative-licensed teacher education students' perceptions of how an asynchronous discussion board mediated their preparation to teach literacy. Context was two required courses: Teaching Reading in Secondary Schools and Teaching & Learning in the Content Area (elementary/primary school).	Multimodal literacies; socially constructed knowledge of literacy content and pedagogy; social constructivist practices; knowledge construction.	<ol style="list-style-type: none"> In what ways will the ALTs use the asynchronous discussion board to mediate intertextual connections in their literacy methods courses? In what ways will the participants use the technology to facilitate exploration of alternative perspectives? What will be the participants' attitude to their peers' contributions to learning? (p. 3) 	Mixed methods study of 44 alternative-licensed teacher education students (ALTs) who supplied written reflective essays on the use of the discussion board in two different courses (one focused on literacy teaching and one focused on teaching English language learners). Questionnaire data were analyzed using factor analysis. Essays were analyzed using a framework of discursive practice.	The discussion boards helped teacher education students to make intertextual connections and mediated learning to teach literacy. Learning and knowledge construction were hybridized due to participants' identities, cultures and life experiences. Multiple perspectives were explored and peers' contributions were valued.
Ajayi, 2011 USA	Pre-service teachers' knowledge about and perceptions of their preparation to teach multimodality/multiliteracies.	Multimodality; multiliteracies; affordances; materiality; synaesthesia; constraints; situated practice.	<ol style="list-style-type: none"> Are pre-service teachers aware of the changing literacy practices in relation to changing textual and media technologies? Do pre-service teachers believe that their literacy courses provide them with skills and knowledge to teach multiliteracies/ multimodality? Do they anticipate teaching new literacies in their own classrooms in the future? (p. 8) 	Mixed methods. Examined 48 pre-service teachers from across the university's teacher education programs using a survey. Quantitative data were analyzed statistically; open-ended data were analyzed thematically.	Participants indicated high levels of awareness of new and changing literacy practices in relation to digital technology. They expressed mixed views about the adequacy of their literacy coursework in preparing them to teach an expanded conception of literacy effectively in school classrooms and voiced concerns about constraints on such teaching within schools.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Burnett, 2011 UK	How pre-service teachers make sense of their digital practices in their personal and their professional lives. Interested in their accounts as “tech users” and as “teachers.”	Digital literacies; digital literacy practices; social practices; self-identity; reflexivity; participatory networked technologies.	How do pre-service teachers make sense of their digital literacy practices in multiple domains? (p. 437)	Three rounds of phenomenological interviews with 7 female pre-service teachers (in the early stages of their studies) over a period of 7 months. Analysis comprised open coding to generate themes and analytic bracketing.	Data suggested that “the contingent relationship between digital practice and identity is significant to understanding why skills, orientations and attitudes associated with digital literacies do (or do not) survive the transition to educational contexts” (p. 434).
Dymoke & Hughes, 2009 UK & Canada	An online wiki community comprising pre-service English and Language Arts teachers and devoted to sharing knowledge about poetry and teaching poetry.	Literacy practices; multimodal text; affordances; digital third space; affinity spaces; collaboration; teacher-writer.	From the title: How can the medium support pre-service teachers of English in their professional learning about writing poetry and teaching poetry writing in a digital age? (p. 91)	56 English and language arts postgraduate pre-service teachers in the UK and Canada were studied as they collectively used a poetry wiki as part of a course. Data comprised all written contributions to the collaborative wiki, a survey, observation notes, and digital artefacts produced by the student teachers. Data were coded independently then collaboratively.	Some student teachers used the space to develop their poetry writing; others developed their technological knowhow. However, these student teachers did not exploit the multimodal affordances of the wiki space.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Gomez et al., 2010 USA	Pre-service teachers engaging in online discussions with high school students about young adult fiction.	New literacy practices; literacy as a distributed practice; distributed cognition; multimodal texts; meaning making; agents; cultural resources; mediation; cultural schemas.	1. How can distributed cognition be enacted in literacy teaching and learning? 2. What is the intersection of tools, culture and social context within a frame of distributed cognition? (p. 20)	Case study conducted across three school semesters of how pre-service teachers used Moodle and its multimodal affordances to engage adolescents in reading a graphic novel. Data also included focus group interviews, online discussion texts, and papers written by the school students. The unit of analysis comprised “agent-acting-within-mediated-means” out of sociocognitive and distributed theories of mind (p. 23).	Data showed how intelligence and meaning making were distributed across interpretive tools. These tools included textual resources, cultural schema, and (the teacher education) program values. Pre-service teachers require ongoing mentoring in using a range of interpretive tools to further students’ (and their own) learning.
Honan et al., 2013 Australia	As a response to teacher accreditation requirements, this study analyzes the literacy practices pre-service teachers demonstrate and need to learn in their degree program.	Literacies as social practices; new literacies; multiliteracies; multimodal literacies.	None specified.	Pilot study. Examined pre-service teachers in a required literacy and English curriculum course. Data comprises students’ multimedia presentations (n=32), and three written texts per student (n=27) that entailed explanation, discussion and description. Data were analyzed using the Four Resources model.	Study found that participants engaged in complex literacies that went beyond accreditation requirements. Understanding of digital affordances varied quite markedly across the group. However, responses to the two tasks tended to be unreflective or simply reflected course content without personal interpretation.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Howard, 2014 Canada	Examining how pre-service teachers engage in affinity spaces and digital composing processes and how this might inform their own classroom teaching.	New literacies; ecologies of practice; affinity spaces; multimodal literacies; digital composing processes.	Objectives: 1. Understand digital composing processes required by teachers to help students learn to create effective texts. 2. Examine the experiences, attitudes and beliefs of pre-service English education students as they engage with multimodal, digital text creation (p. 39).	12 pre-service teacher participants within the same English education course. Data included students' digital journals, interviews, questionnaires, and teacher-researcher observational notes. Analysis was "qualitative and interpretive" (p. 40).	Findings suggest that participating in affinity spaces and authentic participation in them while learning how to compose digitally helps to reshape student teachers' understanding of new literacies and their role in English classroom teaching.
Hundley & Holbrook, 2013 USA	The challenge pre-service English language arts teachers face when required to multimodally use digital technologies as part of their teacher education program (even those technologically fluent in out-of-school contexts) and the consequences of that for their teaching practice.	Digital composition; multimodal composition; multiliteracies; literacy as a network of social and cultural practices; design.	1. In what ways did teacher candidates adapt or struggle to adapt their composing practices to new modes and media? 2. What tensions did teacher candidates experience in their moves from traditional writing to multi-genre, video, and hypertext composition? (p. 501)	Over 3 years, authors examined the work of 65 pre-service English language arts teachers enrolled in a writing methods course designed to support print-based and multimodal composition practices. Data sources included: participants' metanarratives, class exit slips, and video of class discussions. Thematic analysis was applied to these data.	Participating student teachers had to rethink their own experiences of and success with traditional conceptions of reading and writing print-dominant texts when engaging in composing multimodally with digital media.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Hungerford-Kresser et al., 2011/2012 USA	Blogs as a pedagogical tool in content area literacy courses for pre-service teachers.	Context of shared practice; communities of practice; digital pedagogies; new literacies.	What were students' perceptions of the learning that occurred on the blogs? (p. 330)	Mixed method intervention study conducted over 2.5 years. Data included student teachers' blog posts and focus group interviews. Focus groups comprised 6 to 10 students, with one group per course studied. Constant comparative analysis was used to analyze data.	Pre-service students who blogged reported no difference in their learning compared to students who did not blog. Blogging was regarded as a task rather than as a learning opportunity.
Kingsley, 2010 USA	Instructional possibilities afforded by technology-mediated and "critical" instruction, and how these possibilities aligned or collided with classroom teaching (p. 1).	Multimodal literacy practices; technology-mediated critical literacy; literate processes; the Technological Pedagogical Content Knowledge framework.	<ol style="list-style-type: none"> 1. What epistemological and practical opportunities and challenges did the participants encounter in their attempts to integrate critical literacy and technology-enhanced instruction into classroom teaching? 2. What local, institutional, and larger sociopolitical influences shaped teachers' decisions to take up, modify, or reject technology-supported critical frameworks? 3. How might teacher educators assist pre-service and practicing teachers in carving out pedagogical space for the meaningful integration of technology and critical practice within the constraints of a standards-driven curriculum? (p. 8) 	Phenomenological case study of 13 pre-service teachers' and 14 in-service teachers' attitudes, beliefs and experiences as they worked at integrating technology and literacy into their instruction within an education technology course. Data included: field notes, conversation transcripts, artefacts, online discussions, and reflective journals. Data were analyzed using content analysis, positioning theory, and critical discourse analysis.	Participants were optimistic about acquiring digital and critical literacies and bringing them into the classroom. At the same time, they identified risks and dangers for themselves as teachers in doing so due to school conventions and constraints.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Mills & Chandra, 2011 Australia	Working with undergraduate pre-service teachers to explore microblogging as a literacy learning resource.	Multiliteracies; literacy practices; participation; out-of-school media literacies; Web-based social practices.	What are the potentials of microblogging for literacy learning in an educational community? (p. 37)	166 pre-service teachers in a compulsory ICT course. All students learned to microblog within the EDMODO virtual environment. Data comprised relay-written narratives and private reflective blog posts. Data were coded.	Microblogging blurred author and reader distinctions; transformed elements of the writing process; created a supportive virtual community of learners; and promoted self-initiated literacy practices. Student teachers found EDMODO secure, mobile and useful for collaborative writing.
Reid, 2011 South Africa	Explores interpersonal and power dynamics between tutors (i.e., lecturers/professors) and their tutorial groups in closed-group Facebook pages (p. 58).	Literacy practices; out-of-school literacy practices; domains; identities; power; communicative competence; critical literacy; alternative pedagogical space.	Not explicitly identified.	Four closed-group Facebook pages and preservice teachers' posts to these sites over two years. The Facebook groups were part of a compulsory "New Literacies for Teachers" course. Additional closed Facebook groups were also visited and drawn from. Data were analyzed using critical literacy concepts (diversity, access and design).	The closed-group Facebook pages created a safe space for students to talk about teaching practice and ideas, to discuss course readings, and to get to know each other using personal language codes (i.e., not always standard English) which also helped them to redesign their own learning. Traditional university classroom power relationships between tutor and student teachers were reshaped by this space as were traditional gender, race and class boundaries.

Authors & Study Context	Focus	Key concepts	Research questions	Research Methodology	Key findings
Rosaen & Terpstra, 2012 USA	Aimed at developing pre-service teachers' understanding that a rapidly changing world requires expanded notions of literacy and literacy practices.	New literacies; literacy practices; design experiences.	Not explicitly identified.	Collaborative self-study of the evolution of a new literacies project assignment embedded in a literacy course by two cohorts of 51 pre-service teachers across two semesters. Data comprised all texts written during project and coursework, including instructor-produced resources and notes. Data analysis comprised four stages of coding.	Analysis showed expanded conceptions of literacy and increased proficiency in a range of digital technologies. However, these student teachers' nonetheless varied in how they included (if at all) new literacies in their lesson planning work.

These thirteen studies were analyzed initially using what Saldaña (2009) terms First Cycle Inductive Coding, where codes emerge progressively during initial analysis. Thus, codes were created inductively, based on what the studies had to say with respect to teacher education students and digital literacies, then re-examined, in keeping with Saldaña's Second Cycle Coding process. This generated a set of patterns concerning the thirteen studies, which enabled us to see important themes across the articles' findings. Due to space constraints in this article, we focus on just two of these themes here, in order to discuss the ways in which pre-service teachers' digital literacies are being addressed within some teacher education programs in different parts of the world, considering qualitative, socio-cultural research orientations. We acknowledge that this discussion is partial, in both senses of the word. There is much to be had from examining the rich body of work on digital literacies and education in general (especially socioculturally-framed work in Norway [e.g. Erstad, 2013], Finland [Kupiainen, 2012]; the UK [Gruszczynska et al. 2013], and elsewhere). However, this paper aims at focusing explicitly on programs that prepare new teachers for classroom work, in order to contribute important nuance to the sociocultural study of digital literacies within education.

FINDINGS AND DISCUSSION

This section presents some of the results of our analysis of thirteen empirical studies of digital literacies research within pre-service teacher education programs. First, we discuss some interesting overall patterns found across these studies. Second, we discuss two themes most salient across the thirteen studies.

One interesting pattern visible in these studies is that they were almost all situated within teacher preparation coursework and that many of the authors of the papers were the teachers of these courses. Seven of these courses appeared to be mandatory (Kingsley, 2010; Ajayi, 2010; Hungerford-Kresser et al., 2011/2012; Honan et al., 2013; Mills & Chandra, 2011; Reid, 2011; Rosaen & Terpstra, 2012); only one was optional (Burnett, 2011). Four studies did not make clear which kind of courses they were. Only one study was not explicitly embedded in coursework, because it surveyed student teachers across programs (i.e. Ajayi, 2011). While not so surprising given our focus on teacher education, this pattern might nonetheless indicate that digital literacies within teacher education programs tend to be the result of individual faculty decisions and designs, rather than a coordinated and collaborative program of instruction within a given institution. One exception here is Reid's study (2011), which was located within a collaboratively designed "New Literacies for Teachers" course. Nonetheless, this course seems to be a single stand-alone course within a larger program. What is especially interesting is that the bulk of the studies drew on data that was submitted for grades, including grades for participation (e.g. blog posts, multimedia projects, discussion board posts, mind maps, reflective essays). Little of this dimension of the data was problematized with respect to institutional values and forces working on students' coursework productions and how this, in turn, might have shaped findings (for exceptions, see Burnett, 2011 and Gomez et al., 2010). Problematizing this tension between wanting to promote digital literacies in pre-service teachers' coursework and using required assignments as data might be fruitful avenue for future research to examine.

Another interesting—and again not-so-surprising—general pattern relates to the connection of nine studies with English/English Language Arts/Literacy coursework. While only a few studies explicitly declared a school level (e.g. elementary, primary; secondary), we interpreted a focus on “English education/English subject area” to mean secondary pre-service teaching courses and “language arts/literacy” as referring to pre-service teachers enrolled in elementary or primary school specializations. Thus, three studies were grounded in elementary or primary school level literacy or language arts teaching (Burnett, 2012; Rosaen & Terpstra, 2012; Honan et al., 2013), three studies spanned kindergarten to Grade 12 pre-service teachers (Ajayi, 2010; Ajayi, 2011; Dymoke & Hughes, 2009), and three studies focused on preparing secondary English teachers (Gomez et al., 2010; Howard, 2014; Hundley & Holbrook, 2013). The present authors were surprised by this balance in school levels, believing that the increasingly regulated and locked-down early schooling literacy/language arts curricula now operating in many countries (cf., Honan et al., 2013; Knobel & Kalman, 2016) would have dissuaded the inclusion of digital literacies in primary or elementary school specializations.

Three very interesting outliers to this emphasis on language arts/literacy/English courses are Reid’s study, which reports on pre-service teachers enrolled in a compulsory, purpose-built “New Literacies for Teachers” general course, and Mills and Chandra’s and Kingsley’s studies, which were both located within a required information/instructional technology course. For us, this development is promising with respect to digital literacies being taken up more widely across the curriculum and not confined to literacy/language arts/English contexts alone.

A third interesting general pattern is the dominance of print-based digital media in these studies. Four of the studies focused on wikis and blogs (including microblogging) or both (Dymoke & Hughes, 2009; Hungerford-Kresser et al., 2011/2012; Rosaen & Terpstra, 2012; Mills & Chandra, 2011), while two used online discussion forums (Ajayi, 2010; Gomez et al., 2010), and one focused on text posts to Facebook groups (Reid, 2011). Four studies reported on diverse multimedia projects and presentations (open to student teachers’ choices) and different digital tasks—such as creating videos, stop motion animations creation, and digital comics, and participating in online networking and affinity spaces (Honan et al., 2013; Hundley & Holbrook, 2013; Kingsley, 2010; Howard, 2014). Two studies collected data by means of surveys or interviews after coursework had been completed (Ajayi, 2011; Burnett, 2011), which asked pre-service teachers to reflect on personal experiences with digital literacies in general. The dominance of largely text-based digital media—like blogs, wikis, discussion boards and Facebook groups—in this set of studies might be related to their nature: they are easy to use, readily available, low on bandwidth needs, there is documentable writing involved, and they can be used in a more traditional print-based fashion. Therefore, these digital media might well face less resistance on the part of pre-service teachers compared to other digital media, since they can end up being less “confronting” or “demanding.” This text-centric pattern might also be a product of publication dates, too. Wikis and blogs were popular in classrooms during the first half of the 2010s, with other services, networks and interaction spaces coming into vogue more recently (e.g. Facebook as an instructional medium).

Despite the tight inclusion boundaries drawn for this review, and the shared general theoretical orientation of the studies, it was interesting to see the multiplicity of concepts used in these studies to talk about digital technologies and literacies. As mentioned earlier, these included: new literacies, multiliteracies, multimodality, multimedia literacies and literacy practices. In addition, other literacy-related concepts were added to the mix as the researchers scribed their particular theoretical frames, and included: critical literacy, literate processes, participation, collaboration, out-of-school media literacies, web-based social practices, design, identities, power, domains, and the like. This suggests there is no single, agreed-upon way of talking about digital literacies within qualitative sociocultural research. Indeed, even theoretically, these studies blended together a range of theories compatible with sociocultural understandings of the world, so that some were explicitly framed by sociocultural and critical theory, or by sociocultural theories of literacy and social cognition, and so on. Perhaps the most interesting pattern, in relation to theory, was the repeated hailing of the multiliteracies work begun by the New London Group (e.g. 1996; Cope & Kalantzis, 2000) and the multimodality work first developed by Kress (e.g. 2003). Again, this is not an earth-shattering finding, given our explicit focus on literacies, but it does suggest a theoretical interest in design-and-meaning-making and social semiotics that did not necessarily play out in the print text-heavy tasks pre-service teachers were asked to complete in many of the studies. This theoretical blending and the range of concepts used in these studies collectively means there is no single orthodoxy in place that tries to control how digital literacies are construed, which is a good thing. However, it makes reviews like this rather challenging, with respect to examining a particular axis of theory and practice. It also suggests the importance of researchers making their conception of digital literacies explicit in their studies' framing, to help the reader understand their particular orientation, rather than assuming a taken-for-granted meaning.

As mentioned earlier, analysis generated a number of themes across the studies, but due to length constraints, only two themes will be addressed here. In terms of how pre-service teachers' digital literacies are addressed within pre-service teacher education programs across the studies, these are:

- a. digital literacies as linked to out-of-school practices;
- b. digital literacies as providing collaborative and supportive learning.

(a) Digital literacies as linked to out-of-school practices

Six studies in this review construed digital literacies in teacher education as a way to link in-school and out-of-school practices (Kingsley, 2010; Burnett, 2011; Howard, 2014; Reid, 2011; Mills & Chandra, 2011; Hundley & Holbrook, 2013). Within these six studies, participating pre-service teachers typically demonstrated an initial lack of awareness of the possibilities opened up by digital literacy practices when it came to out-of-school practices becoming part of formal education contexts, as one participant was reported saying, "I had no idea that my love of movies and comics could come together with this mechanized thing to create something totally new" (Howard, 2014, p. 43). Another pre-service teacher in a different study explained how she sees out-of-school practices as separated from school work: "[...] thinking in terms of the Internet I think a lot could be used also as part of the

internal network, like in terms with things to do with like displaying star of the week or something like that ... still within that community and nothing to do with the outside world but still internal [...] everything does happen within the school and nothing else, everything else stays outside” (Burnett, 2011, p. 440). The possibility of learning from out-of-school digital literacies as a way to help us understand and plan educational actions certainly has gained traction in academia, and especially in relation to new literacies research. Researchers like Black (2009), Thomas (2007), Ito (2010), and Domingo (2014) have studied fan fiction writing, fan movie remixes, anime music videos, hip hop remixes and music videos created in out-of-school spaces, and have used the results of their studies to make recommendations for classroom practice. It is not overly surprising, therefore, to find academic faculty encouraging their teacher education students to look to their own everyday lives when addressing digital literacies. What is interesting here is how these six studies show that pre-service teachers can be actively engaged in very concrete ways in thinking about and working with digital literacies in their everyday lives. At the same time, these studies collectively suggest that uncertainties also arise when it comes to how these out-of-school experiences with digital literacies can link to in-school practices.

Indeed, three studies showed evidence of pre-service teachers’ active resistance when out-of-school digital practices were either suggested by course teachers or introduced by other pre-service teachers into course activities (Burnett, 2011; Hundley & Holbrook, 2013; Howard, 2014). For instance, in one study, a pre-service teacher complained: “Revising a tweet doesn’t make sense, [...] because it is too short, and it isn’t really a school tool” (Hundley & Holbrook, 2013, p. 505). In a different study, another pre-service teacher claimed: “The way I use computers and mobile phone [sic] is largely about organising myself and communicating with people I need to communicate with ... but children don’t need to do that in the same way in school” (Burnett, 2011, p. 440). This student teacher resistance reminds those of us interested in teaching digital literacies socioculturally that not all teacher education students will be open to taking their own everyday practices into their classrooms. In many ways, this brings an added tension to the body of pre-service teacher research that recommends focusing on everyday digital literacies and taking up elements from them in the classrooms, without considering student teachers as directly involved in this process.

The findings related to pre-service teachers’ resistance to out-of-school digital literacies within university courses, for example, sits interestingly alongside the finding that four out of thirteen studies analyzed in this paper made use of blogs and wikis to practice digital literacies. None of the resistance data was found in studies that made use of these platforms. This underscores the suggestion that teacher education students over the past seven years may well find blogs and wikis more “recognizable” in relation to traditional print-based literacy practices, and may tap more directly into many teacher education students’ existing academic expectations.

Nonetheless, elements of pop culture were explicitly included in three of the studies in which digital literacies are linked to out-of-school practices (Howard, 2014; Kingsley, 2010; Mills and Chandra, 2011). For example Mills and Chandra (2011) show that microblogging was used as a way to collaboratively write contemporary versions of traditional fairy tales in the manner of writing fan fiction out-of-school. One of the pre-service teachers

wrote, for example: “Jimbo [a character on the *South Park* animated television show] turned around and saw Lady Gaga [a popular singer]...and squealed with fright! She looked at him with crazy eyes—the magical disco stick was bait to lure... [sic] [resonates with *South Park* storylines] Lady Gaga wanted to wear Jimbo as her next outrageous costume. She lunged for him...” (Mills & Chandra, 2011, p. 40). This excerpt illustrates how the participating faculty tried to encourage their students to draw on popular culture as a way to link in-school and out-of-school practices. Indeed, Mills and Chandra (2011) report that many of the students in this course voiced feelings of excitement about the possibility of integrating microblogging into their future teaching practices since “it caters to diversity and different learning styles and brings new life to traditional writing activities” (Mills & Chandra, 2011, p. 40).

Returning to this review’s guiding research question, the set of studies showed a marked tendency in pre-service teacher education courses to attempt to link out-of-school digital practices with in-school practices. This was done either as part of student teachers’ university coursework or by having teacher education students reflect upon this connection as a possible resource for their own classrooms.

(b) Digital literacies as providing collaborative and supportive learning

Six studies from the set of thirteen addressed pre-service teachers’ digital literacies as a way of providing teachers-to-be with a chance to learn collaboratively and in supportive ways. Thus, their focus was not so much on learning to use specific digital technologies, but on using technologies in the service of learning (with the goal of having teacher education students perhaps replicate this approach in their own classrooms). Collaborations took the form of participation in affinity spaces (Howard, 2014), online wiki communities (Dymoke & Hughes, 2009), a blog-based community of learners (Rosaen & Terpstra, 2012; Mills & Chandra, 2011), closed Facebook groups (Reid, 2011), and collective sharing and helping within a discussion board (Ajayi, 2010). In these studies, students not only had the chance to experience the digital medium as a collaborative and supportive one, but also to reflect upon this experience and consider the role and place of digital literacies in their own teaching practices. Some examples of this include participants reporting their experience with microblogging: “I appreciate the collaborative approach to learning that this application provides—instant messaging and the ability for the class to be able to see their peers’ work contributes to a sense of classroom community” (Mills & Chandra, 2011, p. 40).

Rosaen and Terpstra (2012) found that, during blog post exchanges, one of the pre-service teachers commented on a peer’s work: “I really enjoyed your sample lesson [...]. I wasn’t even making the connection about how the two could be taught together until your last sentence [...]. I think this connection between the new literacy and the new technology is a solid one because they have an authentic relationship which can be implemented immediately” (Rosaen & Terpstra, 2012, p. 43). In this account, we can see how pre-service teachers started to view digital literacy practices in terms of their possibility for doing things together and learning from each other. What follows on from the idea of learning from each other is a sense of support for how each other’s meaning-making is relevant to the class and to everybody’s learning. It is easy to argue that this creates a sense of community among participating pre-service teachers. This idea is reinforced by another pre-ser-

vice teacher in a different study: “By reading what our classmates have posted on discussion board, we are exposed to other perspectives that we may not have even considered. [...] Once I read what others had to say, I learned not only that there were different ways of approaching the same ‘problem/challenge’, but on many occasions I have had to modify my original postings” (Ajayi, 2010, p. 15-16). Thus, in many ways, the sociocultural orientation of these studies resonates with academic work on communities of practice (Gee, 2000; Lave & Wenger, 1991). As one participant put it: “(microblogging) allows students to feel individually supported by their teacher and also their peers in this educational experience” (Mills & Chandra, 2011, p. 41). This sense of community created through collaboration and support also was reported as being responsible for pushing some students further by providing them with confidence to take risks. One pre-service teacher wrote: “I must confess that this is the first poem I have ever written... I will try and contribute more to this page and to you, my fellow Haikus. I am in awe of ‘We danced through the ashes’ [...] and I think you have a real talent” (Dymoke & Hughes, 2009, p. 98).

Thus, it seems that a focus on digital literacies as a medium of collaboration and learning in these studies really took seriously the *practice* dimension of digital literacies; that is, engaging directly in contextualized and socially recognized ways of acting and making meaning in the digital world (e.g. literary writing benefits from an audience and reader feedback). And, by engaging participants in these practices, it is easy to argue that these studies may well have developed a deep conceptual understanding of digital literacies that will work well in school classroom contexts by detaching digital literacy from a specific piece of software or service, and encompassing instead varied digital practices as well as the communities of practice that can derive from them. Indeed, the fact that participants engaged in and commented favourably upon collaboration and support via their digital literacy practices throughout all these six studies, regardless of the focus of the study in a specific pre-service teacher community, suggests that this may well be a fruitful orientation for teacher educators to have towards digital literacies and pre-service teacher education students.

CONCLUSION

We admit that our circumscribed search and inclusion parameters generated a small number of studies. Nonetheless, it does seem that the sociocultural study of digital literacies and pre-service teacher education is nonetheless a recognizable sub-set of the larger field of digital literacy and education research. There remains plenty of room for growth, however, and this might be of especial interest for doctoral students and teacher education faculty who need to balance teaching demands with their institution’s research and publishing requirements.

Educators studying their own classes and digital technologies have been criticized roundly for using participants and contexts that are “too convenient,” or for generating a fragmented array of stand-alone research cases (cf. Selwyn, 2012). Convenience aside, we argue that it *is* possible to read across the varied studies we have analyzed here and find patterns-in-common that are helpful and insightful for a range of contexts, despite the particularity of each study in terms of its location, the policies and curriculum forces to which

it answers, and student teacher demographics and the schools in which they will teach. Understanding that bridging out-of-school literacies and academic and professional literacies is an important step in helping pre-service teachers to take-up digital literacies in their own classrooms can help to inform the design of coursework tasks that facilitate such bridging. Similarly, recognizing that pre-service teachers seemed to flourish within collaborative projects and spaces can also help with designing future configurations of bringing together digital literacies and learning within—and perhaps outside of—university coursework. Ensuring that digital literacies projects do not always foreground traditional print literacies but truly engage with multimodal ways of making meaning (e.g. voiceovers, music, artwork, colours, attending to text fonts, text layout, video clip transitions, camera angles, image design) is also important for project designers to keep in mind.

That being said, this review also signals that digital literacies, as studied in pre-service teacher education in different parts of the English-speaking world, seem to be—for now—highly dependent on the teacher educator, since these studies suggest engagement with digital literacies is mostly connected to coursework rather than to whole-program curricular decisions. This has, in turn, acted as a spur for the first author, Ana Nascimento, to publish more studies in English regarding her current project with pre-service teachers and digital literacies, especially in relation to the National Pre-service Brazilian Teacher Education Program. In her case, she is focusing on English-language pre-service teachers developing and implementing projects for school children outside their formal coursework, but coordinated across faculty members throughout their four-year teacher education program. At the same time, she is more aware of building in opportunities to collaborate and to bring out-of-school literacy practices to the table when it comes to student teachers designing their projects.

Thinking about the future, there is much to learn from this circumscribed review, both in terms of research and pre-service teacher education practices. After all, linking digital literacies to out-of-school practices and collaborative/supportive learning proved to effectively address initial resistance on the part of some pre-service teachers across these studies. That being said, more socioculturally-oriented research is needed on the take-up of digital literacies within pre-service teacher education. After all, there is no use in equipping schools with digital technologies and services without taking digital literacies into pre-service teacher education as part of the overall curriculum and preparation experience.

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