

Carmen Pérez-Llantada*

University of Zaragoza, Spain
llantada@unizar.es

HOW IS THE DIGITAL MEDIUM SHAPING RESEARCH GENRES? SOME CROSS-DISCIPLINARY TRENDS

Abstract

There is little dispute that technologies are impacting academic communication today, rendering new forms of accessing information and disseminating knowledge. To explore this impact, in the first part of the paper I review a selection of scholarly literature that addresses ways in which digital technologies are shifting the scholars' information access behavior and introducing new forms of research dissemination. I also discuss how these new forms of communication are modeling new ecologies of genre systems and genre sets. In the second part of the paper I conduct genre analysis with a sample corpus of texts from different disciplines to illustrate how the emergence of new multimedia genres and the use of multimodality, hypertextuality and interdiscursivity features in genres within electronic environments appear to be pointing at generic evolution and innovation. In light of the findings, I propose some areas in which genre research can engage in interdisciplinary conversation (with ethnography, academic/digital literacies studies, situated genre analysis and reception studies). Regarding EAP instruction, I suggest a pedagogy that provides corpus-based linguistic and rhetorical input on the new genre formats, opportunities for noticing, hands-on practice and critical awareness of aspects of genre innovation and change.

22

Key words

research genres, genre systems, genre innovation, digital technologies, multimodality, EAP tasks-based learning.

* Corresponding address: Carmen Pérez-Llantada, Department of English and German Studies, Faculty of Arts, University of Zaragoza, 50009 Zaragoza, Spain.

Sažetak

Neosporno je da tehnologija utiče na savremenu akademsku komunikaciju, donoseći nove načine pristupa informacijama i širenja znanja. Da bismo istražili taj uticaj, u prvom delu članka pružamo pregled literature koja se bavi načinima na koje digitalne tehnologije menjaju ponašanje istraživača u pogledu pristupa informacijama i uvode nove oblike prenošenja rezultata istraživanja. Bavimo se i uticajem novih oblika komunikacije na nove ekologije žanrovskih sistema i žanrovskih skupova. U drugom delu članka obavljamo žanrovsku analizu odabranih tekstova iz različitih disciplina da bismo pokazali kako pojava novih multimedijalnih žanrova i korišćenje obeležja multimodalnosti, hipertekstualnosti i interdiskurzivnosti u žanrovima u elektronskom okruženju ukazuju na nastanak žanrovske evolucije i pojavu žanrovske inovativnosti. U svetlu dobijenih rezultata skrećemo pažnju na oblasti u kojima bi žanrovska istraživanja mogla da se obavljaju interdisciplinarno (etnografija, akademska/digitalna pismenost, situaciona analiza žanra i teorija recepcije). Kad je reč o nastavi engleskog jezika za akademske potrebe, predlažemo oblik nastave koji pruža korpusno zasnovan jezički i retorički uvid u nove žanrovske formate i prilike za opažanje, neposredno korišćenje i kritičku svest o aspektima žanrovskih inovacija i promena.

Ključne reči

naučni žanrovi, žanrovski sistemi, žanrovska inovativnost, digitalne tehnologije, multimodalnost, učenje EAP pomoću rešavanja problemskih zadataka.

1. INTRODUCTION

Scholarly work on research genres has been wide-ranging and long-standing, covering a broad repertoire of relatively stabilized genre types such as journal articles, abstracts, book reviews, Masters' and PhD theses or grant proposals, *inter alia*. The prototypical features of these genres, namely, structural uniformity, overall rhetorical organization and phraseological profile, have been extensively described in the literature (e.g. Biber, Johansson, Leech, Conrad, & Finegan, 1999; Biber & Gray, 2010; Liu, 2012; Swales, 1990, 2004, among others). As argued, these genres are highly intertextual (i.e. they are based on substantial source-text material) and dialogic, exhibiting a recurring use of interactional and interactive markers that enable authors to establish writer-reader relationships (Bazerman, 2004; Cronin, 1998; Huckin, 2001; Hyland, 2005; Swales, 2004).

The impact of digital technologies on genres has been investigated extensively in the context of professional communication, in particular, in the

fields of computer-mediated and business communication. Generic innovation and change have ensued from the inclusion of multimodal and hypertextual features in genres in digital environments (see e.g. Garzone, 2009; Lam, 2013). Also, interdiscursivity, or the appropriation of some generic resources from promotional discourses for rhetorical purposes, has been described as a key feature of web-mediated professional genres (Bargiela-Chiappini, 2006; Bhatia, 2010; Lam, 2013). In the context of academia, relatively little has been explored around the use of technologies in everyday academic lives (Hyland, 2011; Luzón, 2013; Mauranen, 2013; Pérez-Llantada, 2013; Sancho Guinda, 2015; Souza, Cabrera, & Braile, 2010). There is therefore a need for stimulating scholarly conversation on issues of genre innovation and change so as to better understand the new forms of research communication in today's academic settings.

Theoretical approaches such as those of the New Rhetoric School and English for Academic Purposes stress that both texts and practices are co-constructed in specific situational contexts (Huckin, 2001; Miller, 1984; Swales, 1990, 2004). Investigating the impact of digital technologies in relation to the co-construction of texts and practices thus seems apposite for the following reasons. Firstly, analysis of texts (i.e. the different genre typologies) can throw light on the enactment of social practices across the different disciplinary communities of practice. Secondly, concurrent analysis of the actual practices can clarify how socially situated interactions shape the textual forms and their functions. Drawing on Harper, Rodden, Rogers, and Sellen's (2008: 40) conceptualization of the 'growth of techno-dependency', that is, dependency on the new capabilities technologies provide, this paper seeks to offer contextual insight into some research genres and genre-based practices that are becoming technologically reliant. The specific aims of this study are, firstly, to identify the recurring themes discussed by the literature regarding aspects of research communication in the digital age and, secondly, to examine some changing research dissemination and publication practices in several disciplinary communities. The following broad research questions helped to identify and organize the main issues of genre innovation and change being brought about by the use of technologies:

RQ1: In what ways are technologies changing the scholars' information access and dissemination practices and in what ways is the digital medium shaping new genre systems, genre sets and, more broadly, a new genre ecology?

RQ2: How does the web environment enable innovation at a micro- and macro-rhetorical level in traditional genres? In what ways does this new medium bring in a new dynamic for social interaction in the selected disciplinary communities?

In organizing and clarifying previous scholarly views on technology-reliant research communication and in exploring discursive practices, the broad aim of this paper is to gain further insights into the account of research genres today. In

light of the findings, the paper will envisage some potential research areas in which genre theory can be applied, developed and expanded. Ways in which web-mediated texts and practices can be relevant to EAP practitioners will be finally discussed.

2. STUDY DESIGN

To explore the impact of technologies on information access behavior and knowledge dissemination practices, this paper combines a systematic literature review of secondary sources with a corpus-based analysis of some research genres, some emerging genres and some features of generic innovation in electronic environments. The literature review was based on an advanced online library search of journal publications, from which a total of 200 sources examining genre-mediated information access and publication practices were retrieved. To aim at representativeness, all secondary sources were extracted from journals from a wide range of interdisciplinary approaches, namely, library and information studies, scientometrics, communication and media studies, ethnography and ethnomethodology, situated learning and literacies. To supplement this data, all the articles published over the last decade in five mainstream linguistics journals (*Applied Linguistics*, *Written Communication*, *English for Specific Purposes*, *Journal of English for Academic Purposes*, and *Computers and Composition*) were also surveyed. Out of the 906 texts surveyed, only 3.5% specifically addressed the influence of digital technologies on research communication, which confirmed the scarcity of EAP research to date on this issue. The aim of surveying both sets of bibliographic sources was to gain insight into the co-construction of research genres and practices in relation to technological advances.

A text-linguistic and rhetorical analysis of some traditional and emerging genres in electronic environments was also conducted. This analysis sought to be descriptive and exploratory of what Schryer (1994: 106) defines as 'sites of competing genres', that is, contexts of professional practice in which genres are used for the enactment of social intentions. This analysis aimed at identifying the extent to which genre evolution, innovation and change ensued from the growing use of technologies in the researchers' discursive practices. Drawing on previous studies' findings (Pérez-Llantada, 2013; Souza et al., 2010), it was initially hypothesized that technologies were triggering generic innovation and change, though not very dramatically. For the analysis, a sample set of 20 online articles and their corresponding multimedia elements – author videos and audioslides (webcast-style author presentations) – were compiled from a major publisher's website. Also, for sampling purposes, a set of 20 PDF articles available online at another major publisher's website as well as their corresponding podcasts (audiofiles with authors' discussion of article contents) were randomly retrieved. Both sets of articles represent a range of disciplinary fields (business management,

language teaching, language testing, composition studies, cardiology, health psychology, psychiatry, genetics, electrochemistry, materials science, computer science, paleontology and parasitology). The textual material, amounting to 231,793 words (91,948 and 139,845 running words for each set of texts respectively), was analyzed at macro- and micro-rhetorical levels. Macro-rhetorical analysis was carried out manually, while micro-rhetorical analysis relied on corpus analytical methods. Fletcher's (2002-2007) phraseological search engine *kfN-gram* was used to retrieve a top-50 list of high frequency 4-grams and identify the intertexts (references to source text material) in the corpus. *Wordsmith Tools* v.5 (Scott, 2008) was used to search for and statistically compute the interactive and interactional metadiscourse markers that Hyland (2005) includes in his list of 289 items with potential metadiscourse meanings in their sentential co-text. As for the multimedia material, author videos, audioslides and podcasts were transcribed for subsequent linguistic and rhetorical analysis. Author video transcripts amounted to 3,165 words and audioslide transcripts totaled 2,653 words. The podcasts transcripts – some of them available at the publisher's website and some of them transcribed by this author – comprised 33,822 words. Given that this multimedia corpus was rather too small to be handled through corpus methods, close textual analysis of the transcripts was carried out to provide some preliminary observations on linguistic features. Manual analysis was used to identify the rhetorical organization of the texts and that of their accompanying multimodal genres, following both Swales' (1990, 2004) genre framework and the generic principles of text-composing in electronic environments (Carnegie, 2009; Müller, 2011). The multimodal features of the first set of articles, i.e. graphical abstracts, interactive graphs and charts were also considered for the descriptive account. Being based on measurable evidence, the quantitative analysis was expected to offer exploratory insights into research dissemination practices and establish links with the main themes discussed in the literature surveyed.

3. SHIFTING INFORMATION ACCESS AND DISSEMINATION PRACTICES

The secondary sources surveyed captured the view of academic settings as relatively stabilized “sites of social and ideological action” (Schryer, 1994: 200), yet seemingly undergoing changing information access and dissemination practices due to the growing dependency on technologies.

One major emerging theme in the literature revolved around the researchers' shifting information access behavior. The studies from the communication and library information science journals surveyed attributed this new dynamic to the advancement of digital technologies in library services. For instance, taking the case of physics and astronomy scholars, Anderson and McMillan (2000) report that

electronic preprints of journal articles and published online articles have become widely accessed genres in digital library repositories. This is in accord with bibliometric evidence that “full text articles are the most viewed items by experienced researchers when using digital journal libraries” (Nicholas, Huntington, & Watkinson, 2005: 253). Not dissimilar are the findings reported by the library information studies surveyed regarding junior researchers’ digital literacy. It is maintained that access to online bibliographic sources has shifted junior scholars’ research material selection. Conkling, Harwell, McCallips, Nyana, and Osif (2010: 209) report that doctoral students in different disciplinary fields (African American studies, business, economics, astronomy, biochemistry, geology, physics, aerospace, electrical and mechanical engineering) opt for journal articles rather than genres such as monographs, dissertations or technical reports.

Several bibliographic sources (including both theoretical studies, reviews and empirical case studies) drew attention to the various advantages of digital knowledge dissemination. They all underlined the idea that technologies maximize the circulation of research findings. For Edminster and Moxley (2002), theses and dissertations can be more easily accessible in electronic format and make graduates’ research more visible. Hahn (2009) highlights the advantages of integrating research articles, monographs, working papers and a blog in a single electronic site. More recently, Meera, Manjunath, and Kaddipujar (2013) highlight the value of imprints collections for information seeking and knowledge dissemination. It is also argued that, along with publication outputs in electronic journals, other digital scholarly resources such as reviews, preprints, conference papers and working papers, e-encyclopedias, discussion forums and web portals maintained by scholarly societies enable fast access and dissemination of research (Howard, 2008; Royal Society, 2011).

The literature reviewed also emphasized the potential of technology-mediated communication to stimulate scholarly conversation. It is argued that email messages, video conferencing, voice over internet protocol (VOIP) and Skype meetings have become new forms of communication that provide increased interconnectedness (Royal Society, 2011). Research blogging as an emerging form of scholarly communication also surfaced as a central issue in some of the secondary sources surveyed. Blogs are characterized as involving a ‘direct presentation of evidence’ and thus being “explicit about what they intend the evidence to do for the argument” (Scholarly Communication Institute, 2010: 15). As for their functionality, it is explained that blogs enable peer-to-peer scientific exchange within different disciplinary communities (Kjellberg, 2009; Mauranen, 2013) and create new peer groups among diversified audiences (Luzón, 2013).

How the scholars’ shifting information access behavior as a result of growing techno-dependency appears to be changing the scholars’ selection of source text references was also recurrently addressed by the literature. The scientometric studies surveyed report gradual changes regarding in-text citation practices in journal articles. Using citation analysis, Abt’s (2007) study of astrophysics journals

over a 5-decade period concludes that readily available online sources are preferred over sources not available on the Internet. This author reports a dramatic increase in the number of journals, electronic preprints and reviews cited and a corresponding decrease in non-online, minor genres (observatory publications, private communications, theses, conference papers and monographs). The ethnographic sources surveyed likewise describe a decline in the printed book and increased electronic literacy among humanities scholars (Knievel, 2009). Results, though, are not fully consistent with those of scientometric studies. De Groot's (2008) comparative study of researchers' citation practices in an urban university and in a smaller regional medical campus concludes that both groups continued to cite print-only journals even if the former population enjoyed a large print and electronic collection in their institution's library.

The literature also referred to the way increasing techno-dependency influences the scholars' view of research publication accountability. The scientometric and bibliometric studies situated the journal article at the core of academia's ecology of genres. This major genre type is consistently defined as a key unit of measure. It is used for assessing individual tenure-track faculty research outreach and institutional outreach (Miller, Coble, & Lusk, 2013; Ruocco & Daraio, 2013), tracking 'citation circles' (Teodorescu & Andrei, 2014), comparing the scientometric profiles of different countries and evaluating the development of world economies (Harzing & Wal, 2009). In contrast, the communication and media studies referred to minor research-related genres with little (or no) accountability value as research publication outlets, yet serving wide knowledge dissemination thanks to technologies. 'Grey literature', including genres such as "technical reports from government agencies and NGOs; working papers from research groups or committees; government white papers, conference proceedings and symposia", nowadays published on internet sites (Royal Society, 2011: 23) have become part of today's ecology of research genres.

Another recurring topic in the literature was the increasing prevalence of new modes of scholarly communication over printed genres which, interestingly, was attributed to the existence of "an information ecosystem that centers around digital evidence, digital authorship, digital dissemination, and digital use" (Scholarly Communication Institute, 2010: 2). New forms of publication and web-browsing practices are described as representing a threat to traditional monographs and printed journal publications (called 'endangered genres'). Knievel (2009) raises concern towards the humanities scholars' dilemma of whether to publish in the 'tenure genres' (i.e. monographs and journal articles) or engage in innovative types of publication on websites such as podcasts. On a different note, Prosser (2004) remarks that economic reasons may account for such prevalence – the adoption of institutional repositories and open access publishing models redresses the current diminution of library budgets.

Lastly, the technological affordances of electronic genres, namely, easy access to online content along with an innovative format that makes information appealing

and more visible also emerged as a recurring theme in the sources surveyed. In the context of humanities scholarship publishing, it is claimed that genres in electronic environments take advantage of those affordances to reach larger and diversified audiences with varied interests (Scholarly Communication Institute, 2011). Taking the case of humanities scholars' academic homepages, Hyland (2011: 294) also notes that online self-presentations draw on a combination of content and appealing visual design and invite readers' interactivity through hypertext links. The rhetoric and composition studies likewise stress the rhetorical functionality of multimedia and multimodal elements, insofar as they break the linearity that is claimed to be essential for argument construction. It is further observed that web-based communication in the humanities context enables new modes of interaction and engagement with greater potential to enhance the role of humanities research (Carnegie, 2009; Knievel, 2009).

Increased electronic literacy and, in stark contrast, the imbalances ensuing from the digital divide were recurrent, though to a lesser extent, aspects addressed by the literature surveyed. The situated learning studies foreground the importance of novice scholars' digital enculturation processes and academic literacy learning of minor research-oriented genres. By way of illustration, Ding (2008: 6) describes how cognitive apprenticeship of academic and digital literacies takes place "[t]hrough social apprenticeship in laboratories, programs, departments, and universities". Analyzing the case of grant proposals, this author holds that knowledge of library resources, online resources and databases, as well as knowledge of the professional website and of the online submission system is best acquired and informally learnt by the novice scholars within their own community of practice. As for the imbalances brought about by digital developments, lack of infrastructure to provide access to digital libraries, limited bandwidth or lack of funding in non-developed countries are reported to be conditions hampering scholarly communication in some world regions (Haliso, 2011). Considering likely that such divide will persist, financial support and initiatives such as publishing in open access journals are proposed as palliative measures (Prosser, 2004; Salager-Meyer, 2008).

4. ISSUES OF TEXT-COMPOSING AND TEXT-RECEPTION PRACTICES

4.1. Generic stabilization

Supporting previous work on generic innovation in the online journal article genre (Pérez-Llantada, 2013; Souza et al., 2010), the set of journal articles selected for the exploratory corpus analysis did not seem to involve substantial genre

innovation and change when framed within an electronic environment. The sampled texts adhered to the expected structural uniformity and the overall macro-level rhetorical organization in the different subdisciplinary fields. Prototypical IMRD (Introduction-Methods-Results-Discussion) was the prevailing structural pattern, although minor variation across the disciplinary spectrum reflected the authors' compliance with the specificities of each subdisciplinary field (Appendix, Table A1). Also, results were in agreement with previous corpus-based studies of academic written phraseology (cf. Biber et al., 1999; Biber & Gray, 2010). Using Biber et al.'s terminology, most of the 4-grams were structurally phrasal (i.e. *in the case of, in the presence of, at the time of, in the form of, on the basis of, etc.*), whereas clausal fragments (e.g. *the extent to which, shown in fig #, shown in table #, presented in table #, in this study we*) amounted to 20% of all grams (Appendix, Table A2). The prevalence of phrasal over clausal material created a structurally compressed discourse style, as expected in texts representative of the academic written register. From a rhetorical standpoint, the three highest frequency 4-grams, *et al #####* and, *et al ##### the, et al ##### in*, supported the view of the journal article genre as being highly intertextual (Appendix, Table A2). Co-textual analysis of these grams showed that the intertexts, that is, the references to source-text material, performed rhetorically (Cronin, 1998; Swales, 2004). Last but not least, writer-reader interaction was constructed through a balanced use of both interactive and interactional metadiscourse markers (Appendix, Table A3). Transition markers represented circa 25% of all interactive markers, followed by endophoric markers, code glosses and sequencing frame markers (the three latter categories amounting to almost 20% of all interactive items). As for the use of interactional metadiscourse, the sampled texts were characterized by a relatively high presence of hedges (circa 25%), followed by boosters, engagement markers, self-mentions and, to a lesser extent, attitude markers. These were similar findings to those previous reported in Hyland's (2005) study of metadiscourse in journal articles. Adherence to the conventions of disciplinary writing thus supported the view that, even if framed within an electronic environment, the journal article remains a stabilized genre in the research fields investigated.

4.2. Generic innovation: interface visibility and multimedia features

The presentation of the journal article contents within an electronic environment did exhibit several features of generic innovation. Unlike personal academic homepages, in which authors freely decide on content page design, visuals and hyperlinks to construct an identity (Hyland, 2011), the interface of the online articles displays a fixed, default three-pane view. The visibility of the interface respects the linearity of the argument. Although a drop-down menu exhibits different display modes, in all modes the full article text appears in the central

pane. Accompanying the article text, the graphical abstracts encapsulate the information provided by the abstract in a single image. This type of abstract is visually attractive and explicit at a glimpse, yet, as Sancho Guinda (2015) notes, it does not extend the information of the standard verbal abstract. The same applies to the interactive figures/tables and charts in the article text, which add very little to the article content. By clicking on a table, different visual options are displayed – view in sidebar, open in new window, download full image, download powerpoint. Interactive charts, three dimensional images, interactive zoomable plates and interactive geographical maps, also innovative features supported by the web environment, are visually appealing and are tailor-made to suit the particular communicative needs of each disciplinary community.

The video abstracts analyzed summarize the contents of the article and perform a screening function. Apart from their visual impact, not much is added to the content provided by the traditional article abstract. The author videos embedded in the different rhetorical sections of the online article do expand the article contents as they provide information on what happened ‘behind-the-scenes’ (e.g. the challenges faced and the decisions made when conducting the research), as well as details about the rationale for the study and the methodological procedures followed. One might initially conjecture that, in capturing the readers’ attention at a glimpse, the inclusion of these videos creates “the perception of being more connected” (Carnegie, 2009: 169). It should be noted, though, that the videos only show up when clicking the third-level tab, and the innovation is somehow backgrounded in the interface.

The most recently published articles compiled for the corpus analysis include audioslide presentations instead of embedded videos. These appear in the right-hand side pane of the interface and are structured as follows: a brief introduction, a statement of purpose, a synthetic account of methods, findings, conclusions and/or implications, by this means maintaining the linearity of argument and mirroring the overall rhetorical organization of the article texts. Considering the average duration (4-5 minutes) of the audioslide presentations, it can be deduced that this genre does not grant authors much time to expand the journal article contents, as the embedded videos did, only to sketch them out. In offering a synthetic overview of the article contents, the audioslides serve to encapsulate the essential information of the full text, and in this sense they recall the functions ascribed to article abstracts: stand-alone mini-texts giving readers a quick summary of a study topic, methodology and findings; screening devices enabling the reader to decide whether to read the article as a whole; and previews for those readers who do opt to read the article as a whole (Huckin, 2001: 93).

The text-linguistic analysis showed that the narrations accompanying the audioslide presentations exhibit both interactive and interactional metadiscourse features. As illustrated in Table 1, interactive expressions serve to signpost the audience (e.g. *I’ll be discussing [...]; the objective of the present study [...]; In conclusion, [...]*). On the other hand, the use of personal pronouns and possessive

forms enables authors to create proximity with readers (e.g. *Ladies and gentlemen, welcome to our audioslide presentation; we invite you to enjoy the article*). At times, the authors convey tentativeness (e.g. *To the best of the author's knowledge*) and, at other times, they express overt evaluation (e.g. *this is the highest power conversion efficiency [...] recorded so far: ecofriendly and cost-effective power photocells*). It is likely that the publisher's audioslide narration guidelines, inviting authors to convey information clearly and persuasively, may have influenced the authors' use of both metadiscourse types. Future research would be desirable to support this hypothesis.

RHETORICAL SECTION	EXAMPLE #1	EXAMPLE #2
Introduction	Ladies and gentlemen <u>welcome to our audioslide presentation</u> I am [...] from the University of [...] and <u>for the next five minutes I'll be discussing a recent paper</u> entitled [...] <u>The objective of the present study was</u> to examine the zona surface morphology of large ovarian canine oocytes with scanning electron microscopy.	<u>This video is to introduce</u> a paper entitled [...] by [...], published in the Journal of [...] <u>Let's start with the motivation for the present work</u> The polymer photocells based on bulk heterojunction composites consisting of conjugated polymers and fullerenes [...]
Methods	To address this, three experiments were performed. [...] were examined by scanning electron microscopy [...]	In this paper, by utilizing a low energy polymer, PTB7, a conversion efficiency of PCE 3% has been achieved.
Results	When grouped by age of canine oocyte donor juvenile mature dogs had the frequency of zona type 3, yellow bars and 4, blue bars. [...]	To the best of the author's knowledge, this is the highest power conversion efficiency in the solution process of polymer photocells using neat fullerenes recorded so far.
Conclusion	<u>In conclusion</u> , we found that the external surface of zonae of ovarian [...] <u>Thank you for your interest and we invite you to enjoy the article.</u>	<u>In conclusion</u> , the combination of halogen-free solvents and neat fullerenes potentially offers a way to realize <u>ecofriendly and cost-effective</u> power photocells. <u>Thank you for your kind attention.</u>

Table 1. Samples of audioslide rhetorical organization, metadiscourse (underlined) and register features

As for register use, the audioslide narrations are not delivered in the conversational style that characterized the authors' embedded videos. Rather, they stick to the formality of the academic written register. Given that the speed of the delivery of the audioslide presentations is faster than that used by the authors in embedded videos, it might be conjectured that authors are reading from a script rather than delivering an extemporaneous speech.

Along with these new genres and genre features, the web-based interface of the online articles also offers readers the possibility to choose different entry points and reading paths. Two navigation sidebars invite modular reading. The left-hand sidebar displays the article outline and site-internal hyperlinks to the different micro-level rhetorical sections of the article, tables, interactive figures,

graphs and, if any, embedded videos. The right-hand sidebar includes links to authors' institutional information, appendices and datasets, hyperlinks to related articles and citation records. As also noted by Hyland (2011) and Luzón (2013) for academic homepages and blogs, the combination of text-, audio/video- and hypertext features affords greater manipulability of options for accessing the information.

4.3. Other innovation features enhancing article contents

The electronic environment appeared to further support other new forms of research dissemination in the disciplinary fields under study. This was the case of the podcasts displayed on the publisher's website next to the hyperlink of the journal article in pdf format. The corpus analysis showed that these audio-narratives take the form of an informal interview – following a question-and-answer format – between the author of the article and the journal editor. Content analysis indicated that the aim of the podcasts is to comment on the same scientific contents discussed in the article in an approachable and appealing way, apparently aiming at a non-highly specialized audience. The authors contextualize the research, explain its rationale, data sample selection and analytical procedures. In this sense, podcasts act as 'teaching tools', as the publisher's website also states. At a rhetorical level, the podcasts appeared to adhere to a systematic move-based organization (Table 2), suggesting that the publisher might be using a pre-established template for content organization.

In Move 1, the editor introduces the author and invites him/her to comment on the back-story of the manuscript. The goal of Move 2 is to contextualize the article contents (e.g. with comments on author's prior/current research, social research networking, institutional background). In Move 3 the editor invites the author to clarify or elaborate on methodological and/or conceptual aspects and/or to discuss the 'behind-the-scenes' of the research. Finally, in Move 4 the editor praises the author's explanations and makes the research appealing to the listeners. A conversational style supports the friendly, pedagogically-oriented dialogue. The authors' explanatory accounts very much contrast with the editors' straightforward evaluation of the authors' findings throughout the interview – particularly, when opening and closing the interview. It can thus be surmised that the podcasts appropriate some promotional features of advertising discourse, as other research-oriented genres such as abstracts, grant proposals and submission letters do (Hoover, 2012; Okamura & Shaw, 2013; Tardy, 2003).

	EXAMPLE #1	EXAMPLE #2
MOVE 1	From the University of [...], this is [...] with another issue of [...]. In issue 31.1 of [...] <u>we are delighted</u> to publish a paper by [...] from the University of [...] on the reliability of [...].	Hello, I'm [...] editor of [...]. Well today we have with us Dr [...] discussing the latest piece and has received our <u>prestigious award</u> for excellence in research. Welcome Dr [...].
MOVE 2	Perhaps <u>we can just set the scene for listeners</u> to the podcast who might not be familiar with the field in which you've been working. Can you explain <u>for us</u> why researchers [...]?	First <u>I really like</u> the almost polemical tone of your article. A <u>strong call</u> for researchers [...] Can you explain the emphasis behind this project? In other words, what's the backstory?
MOVE 3	Thanks for making that clear. I can see why [...] is going to be <u>an important issue</u> in this context.	I think that's <u>a very important insight</u> . And next I'd like to follow up on something you mentioned about the topic of research [...]
MOVE 4	Many thanks for telling us about your research and for your insights into these wider issues of [...]. <u>Your article had added greatly</u> to the diversity of assessment interests that are represented in the journal and <u>I am sure that our readers will not only enjoy hearing about what you do but will be inspired in their own research</u> [...]	<u>Sounds fascinating sounds very very important</u> may be some of this work may come to pages [...] I'd like to think so And <u>I really appreciate</u> your talk very enlightening thank you for your time and we'll speak again I hope.

Table 2. Rhetorical organization, discourse and register features of podcasts

Kleinman (1996: 76) claimed that in the web space “stories are written that change with each new reader”. In the disciplinary contexts investigated, the ‘research stories’ that authors tell in their journal articles do not change with each new reader. What the web environment does is offer multiple research narrations: the narration of the journal article itself, the authors’ narration of their research and, one might even suggest, the editors’ own narration, hence corroborating that digital interfaces open new possibilities for text-reception (Carnegie, 2009; Lam, 2013). From a discourse standpoint, the reader may opt for an informative and/or a promotional discourse, a formal reporting and/or conversational account of the story and textual and/or multimedia material. One may thus conclude that these new forms of accessing information somehow problematize the well-delimited audience and communicative purpose(s) parameters that have so far been ascribed to research-oriented genres. As Luzón (2013) claims for emerging scholarly genres such as research blogs, it appears that journal articles within electronic environments do not only serve to communicate knowledge to a highly specialized readership. They disseminate research findings to a diversified audience, perhaps not specialized in the discipline, or else perhaps researching in interdisciplinary fields.

The exploratory corpus findings seem to point to ongoing evolution and, possibly, eventual stabilization of the emerging genres described above. That said, it is not easy to ascertain the researchers’ response to these new practices for research dissemination and information access. It is likely that audioslides and podcasts will become popular research outlets in the near future if their use sediments within the disciplinary communities that are already acquainted with these new formats. In terms of accountability (e.g. for research assessment

exercises), the value attached to these emerging genres is not yet certain. Other questions to be posed are whether or not researchers will spend their valuable time in composing supporting genres (audioslides, podcasts) or supplementary elements (graphical abstracts, embedded videos) or whether they will be 'forced' to do so if these genres become mandatory in the future. Findings from a large sample population surveyed show that researchers attach more value to the primarily informational, 'research telling'-oriented genres (e.g. the article and abstract) than to multimodal genres and web-based interactive features. However, as argued elsewhere (Pérez-Llantada, 2013), the new forms of communication that the web environment offers do not seem to escape the researchers' notice when accessing scholarly information online.

5. CONCLUSIONS AND IMPLICATIONS FOR THE EAP RESEARCH AND TEACHING AGENDAS

The present study sought to organize and clarify previous scholarly views on the growing use of technologies for research communication, explore emerging discursive practices and, in doing so, gain further insights into the account of research genres in today's research settings. Broadly, the study findings show that increasing techno-dependency appears to be impacting the professional and discursive practices of different communities of researchers in various ways.

In response to RQ1, *In what ways are technologies changing the scholars' information access and dissemination practices, and in what ways is the digital medium shaping new genre systems, genre sets and, more broadly, a new genre ecology?*, from the findings reported above, it is possible to discern a steady shift of knowledge access and dissemination practices away from traditional forms of communication in the disciplinary communities examined by the literature. As the secondary sources attested, increasing reliance on digital library systems seems to account for the scholars' greater preference for scholarly sources that are easily-accessible in electronic formats. Given that, as reported, digital literacy skills are increasing, it comes as no surprise that junior researchers prefer online theses and dissertations, articles, abstracts and preprints of printed text-formats for faster access, or that new forms of communication such as academic homepages and research blogs boost interconnectedness and social networking. In this new scenario, research genres have been shown to support "systems of complex located literate activity constructed through typified actions" (Bazerman, 1994: 67). Within these systems, major genres (the journal article and the abstract) remain stable, while others (e.g. the monograph and the technical report) may be endangered unless they are integrated in a single electronic site. Some minor genres such as those referred to as 'grey literature' (e.g. working papers, white papers and conference proceedings) become more prominent on the web space. Together with the emerging genres, part-genres and multimedia innovations

described earlier in this paper, they form new genre systems and genre sets which are sufficiently open-ended to assist the new communicative demands of the disciplinary communities. Further, the exploratory analysis suggests that with the advancement of the new technologies, both traditional and emerging genres interrelate with each other constructing a 'dynamic equilibrium' (Spinuzzi & Zachary, 2000: 175). In doing so, they seem to be modeling a new genre ecology dynamic enough to respond to the contingencies of research communication in the digital age. This ecology is not dissimilar to the genre ecologies operating within business communities (Orlikowski & Yates, 1994; Yates & Orlikowski, 2002), which indicates that the impact of technologies across professional contexts is a global phenomenon.

How does the web environment enable innovation at a micro- and macro-rhetorical level in traditional genres, and in what ways does this new medium bring in a new dynamic for social interaction in the selected disciplinary communities? (RQ2). Overall, the corpus analysis has shown that well-established, major genres (e.g. the journal article and the abstract) retain their generic identity in terms of linguistic/rhetorical form and function. In fact, there seems to be little scope for generic innovation in these genres, even if the new medium enhances their contents through multimodal, interdiscursive and hypertextual features and affords a higher level of interactivity. It is therefore very unlikely that these stabilized-enough genres undergo substantive generic evolution and change, at least, in the near future. On the other hand, emerging forms of communication such as graphical abstracts and podcasts have shown to be heavily dependent on conventional linguistic and rhetorical conventions, possibly because they constellate around stabilized genres. From the analysis, it also seems clear that lack of stabilization makes some of these new forms disappear, as was the case of the embedded videos. Other emerging forms such as graphical abstracts and audioslide presentations might be in the process of consolidation and, in order to become stabilized genres, their functionality needs to successfully fit with the demands of the disciplinary communities.

The findings do seem to support the assertion that genres assume new shapes when they migrate to the web (Edminster & Moxley, 2002; Hahn, 2009). Features of multimodality, interdiscursivity and hypertextuality accompanying stabilized genres appear to indicate that, in assuming new shapes, genres evolve with the changing text-composing practices, information seeking and reading behavior in the disciplinary communities investigated. As illustrated above, greater reliance on technologies tends to influence authors' rhetorical decisions in composing online articles, abstracts, scholarly homepages, research blogs and grant applications (Ding, 2008; Hyland, 2011; Hoover, 2012). As for text-reception, the findings of the present study attest that in the digital age research dissemination affords greater manipulability and targets a wider, diversified audience, thus bringing in a new dynamic for social interaction. Aligning with Giddens (1984), it can be concluded that both 'structures' and 'agents' ought to be

considered holistically so as to better understand aspects of generic stability and change in research communication.

If we turn to the implications of the present findings for the future EAP research agenda, it seems clear that the changes brought about by technologies make academia an ideal hub for conducting academic and digital literacy research, as well as ethnographic exploration of different cohorts of disciplinary communities. Following the analytical frameworks described by Lillis (2008) and Maybin and Tusting (2011), it is worth investigating in depth how genres are actually accessed and used for disseminating knowledge. The typified activities in which these communities are discursively engaged in the digital age also require further descriptive accounts. How technology impacts on the different disciplinary 'tribes' would likewise profit from investigative efforts. The limited corpus size and the amount of material available for the corpus compilation actually reflected that researchers in highly competitive disciplinary fields are more inclined to engage in the new forms of communication that appropriate features of promotional discourses than those in non-competitive disciplines. Xu (2010) argues that, while offering value-added services for both authors, readers and libraries, the new scenarios for online navigation in scientific publications tend to overwhelm users by making available so much additional detailed information. Whether this is the case across the spectrum of disciplinary communities is still uncharted territory.

Research on situated learning (Lave & Wenger, 1991) and situated genre analysis can also advance our understanding of the disciplinary communities' discursive practices and, more specifically, of the junior researchers' academic and digital enculturation processes. Issues regarding the divide between those raised digital and those born digital and the challenges posed by technology use in both cohorts are also aspects worth investigating. Investigation of professional and discursive practices can yield a holistic view of the way knowledge of genres, as prototypical templates, are comprehended, acquired and appropriated by the members of the scholarly community. Informing this conversation, reception studies along the lines developed by Paul, Charney, and Kendall (2001) and Swales and Leeder (2012) are desirable so as to determine the extent to which the new strategies for calling the readers' attention – multimedia argumentation, interface interactivity and hypertextuality – and the perception of greater proximity increase the citation impact of research publications. Carnegie (2009: 166) maintains that "higher levels of interactivity and thus involvement produce higher levels of acceptance, making the user more disposed to persuasion".

We stressed elsewhere the value of corpus and task-based instruction in EAP teaching/learning (Pérez-Llantada & Swales, forthcoming). Pedagogical tasks grounded on theories and principles of second language acquisition can raise early-career researchers' awareness of the innovations accompanying traditional genres. For example, it seems sensible to expose the students to corpus samples in their particular disciplinary field illustrating the linguistic and multimodal features of the new genres. Given the findings above, helping the students notice the

formation of genre sets and their affordances (enhanced content, increased visibility of research, social networking) also seems pedagogically advisable. Likewise, tasks raising awareness of the forms and the goals of multimodal, interdiscursive and hypertextual features in genres within electronic environments can elicit recognition of the informative/persuasive discourses and the combination of verbal/visual modes.

Addressing genre variation and generic adaptation to the digital signs of the times in the EAP classroom can be sustained by pedagogically reasoned hands-on tasks on text-composing and text-reception processes. Creating their own audioslides, embedded videos and podcast interviews can be stimulating activities, above all, to the born digital researchers. As for aspects of text-reception, corpus-based tasks can be designed so that the students self-assess their own information access behavior, test the degree of interface interactivity and assess its added value. Critical reflection on the ways in which web interfaces are constructed to target at both specialized and heterogeneous audiences or, on a different note, reflection on the extent to which genre innovation is valuable for wide dissemination and visibility of research can also be based on a corpus and task-approach.

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38

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CARMEN PÉREZ-LLANTADA is Professor of English Linguistics at the University of Zaragoza (Spain). Her current research interests include the role and functions of genres in multilingual academic settings, genres and language ecologies, English as a Lingua Franca, and genre literacy and second language learning. She has published on these research interests in *English for Specific Purposes*, *Journal of English for Academic Purposes*, Continuum, Mouton de Gruyter and Routledge.

Appendix: Supplementary data

Table A1. Rhetorical patterns

PATTERN TYPE	Nº	%	CUM. %
Introduction-Method(s)-Results-Discussion	13	32.5	67.5%
Introduction-Method(s)-Results-Discussion-[Implications]	1	2.5	
Introduction-Method(s)-Results & Discussion	1	2.5	
Introduction-Method(s)-Results-Discussion & Conclusion	1	2.5	
Introduction-Method(s)-Results-Discussion-Conclusion	10	25	
Introduction-Method(s)-Results-Discussion-Limitations/Fut. research-Conclusion	1	2.5	
Introduction -Experimental-Results-Discussion	1	2.5	22.5%
Introduction- Experiment-Results & Discussion	1	2.5	
Introduction- Experimental-Results & Discussion-Conclusion(s)	6	15	
Introduction-Results & Discussion-Conclusion-Experimental section	1	2.5	
Introduction-Geological settings-Results-Discussion-Conclusion(s)	2	5	10%
Introduction-[Past studies]-Geological setting-Methods-Results-Discussion	1	2.5	
Introduction-Procedures-Results-Discussion	1	2.5	

Table A2. Top high-frequency 4-grams

N-GRAM	OVERALL OCCURRENCES PER 100,000 WORDS	N-GRAM	(CONT.)
<i>et al ##### and</i>	31	<i>shown in table #</i>	6
<i>et al ##### the</i>	31	<i>in terms of the</i>	6
<i>et al ##### in</i>	14	<i>in the form of</i>	6
<i>as well as the</i>	12	<i>on the basis of</i>	6
<i>in the case of</i>	11	<i>the end of the</i>	6
<i>in the present study</i>	9	<i>the results of the</i>	6
<i>shown in fig #</i>	9	<i>from ## to ##</i>	5
<i>in the presence of</i>	8	<i>in relation to the</i>	5
<i>on the other hand</i>	8	<i>in this study we</i>	5
<i>in terms of their</i>	8	<i>presented in table #</i>	5
<i>the extent to which</i>	7	<i>the time of the</i>	5
<i>at the time of</i>	6		

(cut-off point= 5 times per million words; dispersion criterion = occurring in at least 10% of the texts)

Table A3. Interactive and interactional metadiscourse items (*per 100,000 words)

METADISOURSE CATEGORIES	TOTAL OCCURRENCES*	CUMULATIVE TOTAL	COMPARATIVE %	CUMULATIVE %
Interactive metadiscourse		2519		46.93
Code glosses	354		6.6	
Endophoric markers	421		7.9	
Evidentials	45		0.8	
Frame markers				
Sequencing	281		5.2	
Label stages	47		0.9	
Announce goals	88		1.6	
Shift topics	6		0.1	
Transition markers	1275		23.8	
Interactional metadiscourse		2844		53.03
Attitude markers				
Boosters	209		3.9	
Self-mention	530		9.9	
Engagement markers	349		6.5	
Hedges	529		9.9	
	1227		22.9	