

Digital science communication practices and public engagement

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47th AEDEAN Conference, 6-8 November, 2024 (Seville, Spain)



Co-funded by
the European Union



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DOI: [10.5281/zenodo.14063935](https://doi.org/10.5281/zenodo.14063935)

Digital language and communication training for EU scientists

Communicating science beyond expert audiences

Priorities & Topics



Relevant priorities

Addressing digital transformation
through development of digital
readiness, resilience and capacity.



Additional priorities

Developing STEM/STEAM in higher
education, in particular women
participation in STEM.
Stimulating innovative learning and
teaching practice.



Topics

Digital skills and competences
Development of training courses
Key competences development



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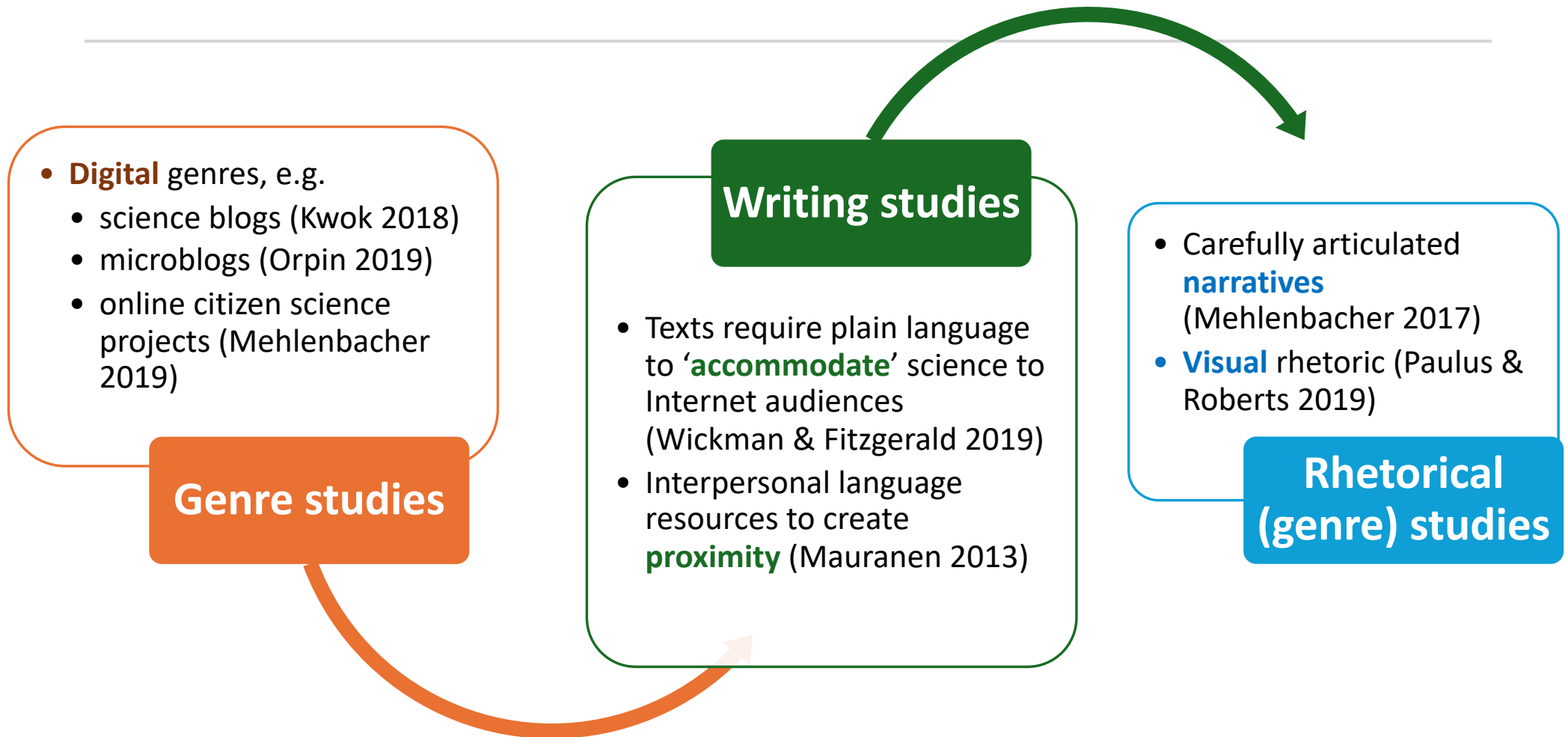
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Women scientists' professional and public digital science communication practices

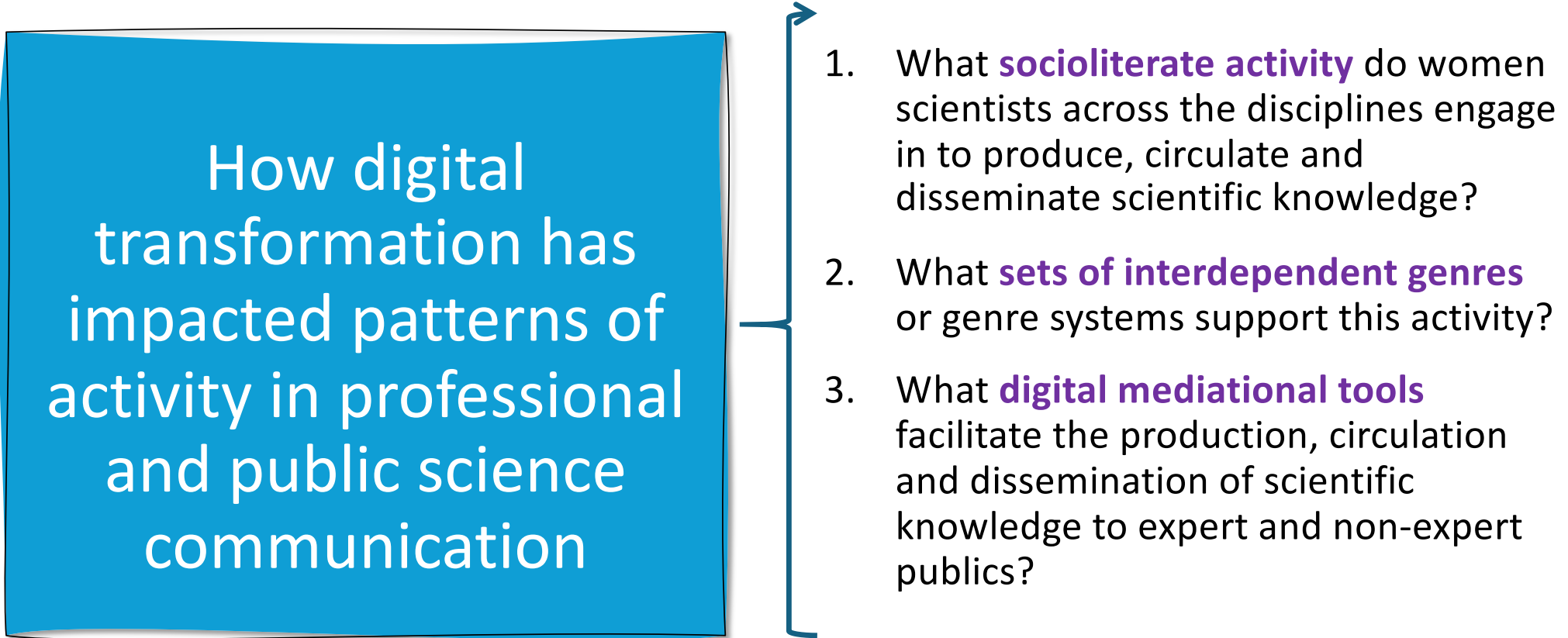
- According to Pérez-Llantada (2021), there's been changes in:
 - **socioliterate activity**
 - processes of **production, circulation and dissemination** of scientific knowledge
- Diversity of **workplaces**, with activity within and outside the work place, i.e. changing communication dynamics (Bazerman 2004; Spinuzzi 2001; Wickman & Fitzgerald 2018)
- **Digital technologies** and **socially responsible research** (Loroño-Leturiondo & Davies 2018) fostered by Open Science & democratization of science (Bartling & Friesike 2014)

Framing the study



Research questions

How digital transformation has impacted patterns of activity in professional and public science communication

- 
1. What **socioliterate activity** do women scientists across the disciplines engage in to produce, circulate and disseminate scientific knowledge?
 2. What **sets of interdependent genres** or genre systems support this activity?
 3. What **digital mediational tools** facilitate the production, circulation and dissemination of scientific knowledge to expert and non-expert publics?

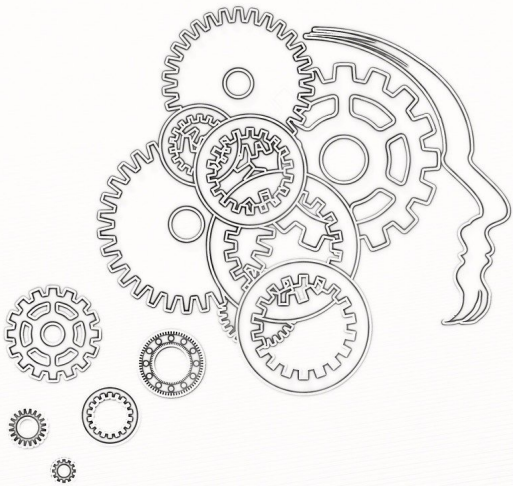
Research design

PHASE 1 Survey research (cross-sectional)

- Part I → impact of digital transformation & emerging forms of communication
- Part II → digital genres for science com. to expert and non-expert publics; value of digital genres professionally and individually
- Part III → use of technological objects and artefacts supporting discursive practices
- Approved by ethics committee (N^a ref^a.: RAT 2023-183)

PHASE 2 Qualitative, open-ended interview-based study

PHASE 3 Experimental study of writing processes across modes/media



Data collection and analysis

874 responses (24.56% of total population), margin of error of + - 3%
Descriptive/inferential statistics (SPSS 13.0.0)

Qualitative values

Pearson Chi-square test and Yates' correction or Fisher's exact test applied when chi-square tests not applicable

Ordinal quantitative variables

comparison across **disciplinary fields** (i.e. SS, BHS, HA, EM)

Quantitative values

non-parametric Kruskal-Wallis test.

Statistics

Multiple comparisons between groups to determine significance
Tested at ≤ 0.05 (95% confidence level)

Theories for data interpretation

Genre theory (Bhatia 2004)

- **structure** in the data
- **frame** the interpretation of patterns of difference, absence, and similarity range of genres

Activity theory (Yates & Orlikowski 1992)

- “key dimensions of **collaborative** work have all shifted [...] encouraging different types of **social interaction**” (p. 14)

Genre systems (Bazerman 1994, 2004, 2015)

- insight into how texts and textual practices are **organised**

Digital transformation (Finnemann 2016)

- role of **networked digital media** in discourse practices
- Assess pedagogical implications



Technology mediated activity

Main findings (i)





Main activity types

- Activity to collaborate with other national/international colleagues (OA scientific publications, research project proposals) **92.41%**
- Activity to reach out the scientific community at national level (websites, blogs, newsletters, repositories, social networks) **87.69%**
- Activity to reach out the scientific community internationally (websites, blogs, newsletters, repositories, social networks) **87.08%**
- Activity to increase visibility and recognition as a researcher (having an institutional/group/personal website, a blog, writing electronic newsletters and OA popularization articles, using repositories and social networks) **72.11%**
- Activity to give visibility to the transfer of research results (online technical reports, patents on the Internet, corporate social responsibility reports) **48.14%**
- Activity to disseminate results to general, non-specialised audiences (websites, blogs, social networks, newsletters, science popularisations, forums (Reddit) and crowdfunding or citizen science platforms) **48.06%**

Involvement and perceived importance of activities

Type of activity	Professional context	Individuals
Activity aimed at collaborating with national and international colleagues	88.33%	92.33%
Activity aimed at reaching out to the international scientific community	81.92%	87.3%
Activity aimed at reaching out to the national scientific community	76.54%	83.3%
Activity aimed at promoting scientific culture and open science	64.42%	82.61%
Activity aimed at gaining visibility and recognition as a researcher	73.11%	81.35%
Activity aimed at disseminating research to non-specialised audiences	62.47%	80.55%





BHS professional context compared to...

SS context

- Act. reaching out to the scientific community ($p = 0.014$)
- Act. collaborating with national and international colleagues ($p = 0.005$)

EM context

- Act. disseminating research results to a broad audience ($p = 0.001$)
- Act. promoting scientific culture and open science ($p = 0.012$)

HA context

- Act. giving visibility to the transfer of research results were perceived as more important ($p = 0.002$)

* Statistically significant differences in perceived importance of activities across professional contexts.

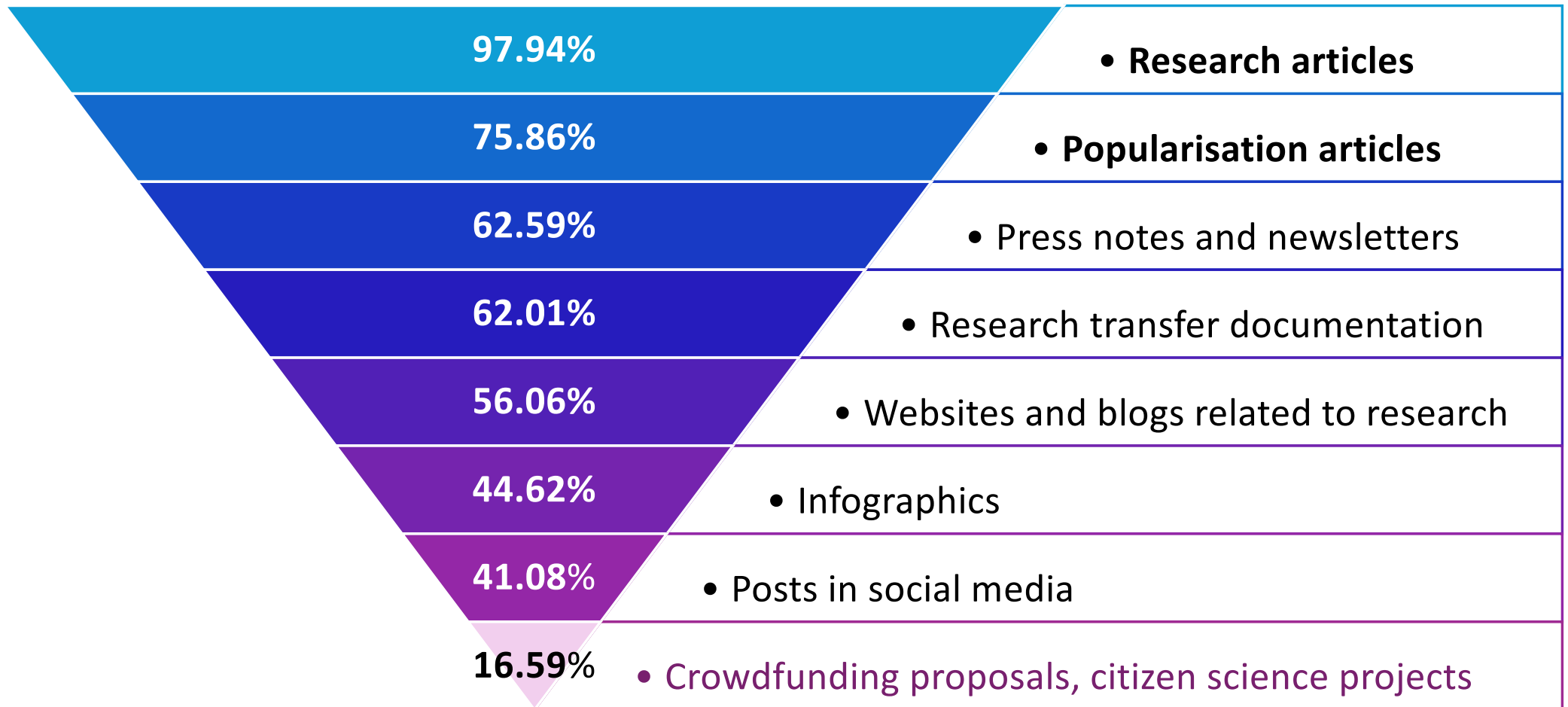


Genres supporting activity



Main findings (ii)

Centrality of genres



Divergences across disciplinary groups

BHS group's professional context places greater importance on:

- **open access journal articles** than the EM and SS do (p-values of 0.045 and 0.019)
- **e-press release notes and e-newsletters** than the HA, EM and SS groups (p-values of 0.004, 0.001 and <0.001)
- **crowdfunding and CS projects online** when compared to the HA, EM and PS contexts (p-values of 0.006, 0.005 and <0.001)
- **infographics** compared to that of the PS group (p = 0.012)
- **blogs** significantly more important than in the PS context (p = 0.001)

*Statistical significance tested

Respondents' importance of genres



HA, EM and PS < BHS
respondents give
more importance to:

- **crowdfunding** and **citizen science projects** (p-values of 0.005, 0.004 and <0.001)

EM < BHS
respondents give
more importance to:


- **microblogging** (p-values of 0.010)

PS < BHS
respondents give
more importance to:

- **infographics** (p-values of 0.010)

EM < HA
respondents give
more importance to:

- **research websites** and **blogs** (p-values of 0.022 and 0.016)



Digital tools and resources

Main findings (iii)



Digital tools for public science communication (i)

Online writing tools, online dictionaries, translation tools (e.g., Word checker, Grammarly, DeepL)	YES (67.03%)	NO, BUT (11.9%)
Data/information collection tools (e.g., Google forms, GitHub, Mendeley, ...)	YES (41.14%)	NO, BUT (15.62%)
Digital collaborative spaces (e.g., Google suite, Dropbox, OneNote)	YES (42.28%)	NO, BUT (13.06%)
Content editing tools (e.g., Wordpress, Wix, Webflow)	YES (37.93%)	NO, BUT (22.64%)

Digital tools for public science communication (ii)

Artificial Intelligence tools to generate content and images	YES (24.18%)	NO, BUT (40.6%)
Crowdfunding and citizen science e-platforms	YES (16.78%)	NO, BUT (32.88%)
Tools for adapting specialised content to non-expert audiences (e.g., Readability test, Automatic readability checker, De-jargonizer)	YES (10.33%)	NO, BUT (39.51%)

Statistical differences in use of digital tools

No statistical differences in the use of **collaborative spaces, online writing tools** and **tools for adapting specialised content to non-expert audiences**

- **Content editing tools** showed significant associations with the HA, SS and PS groups ($p = 0.037$), not with the EM and BHS groups, significantly associated with *Not planning to use them in the future*
- Only BHS group associated with **use of crowdfunding and citizen science e-platforms**, and this group and the SS group showed an association with using them in the future
- **AI tools to generate content/images** significantly associated with EM and SS. But HA associated with *not planning to use them in the future* responses while PS showed mixed behaviour (associated with both *not planning to use them in the future* and *planning to use them in the future*)



DISCUSSION OF FINDINGS

Digitally mediated activity

“Change results from historically situated human interactions” (see Russell 1997; activity theory)

Main changes

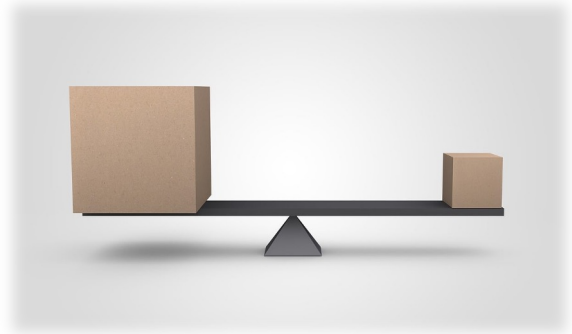
- publishing articles in open access journals
- academic social networking sites
- social media for reaching diverse internet communities

But **differences in all the disciplinary** groups

- range of interactions, publication strategies, data sharing practices, and communication approaches
- Disciplinary (professional) cultures (Bhatia 2004)

Policy mismatches? DM practices vs personal views

- Activities on **national and international networking** knowledge sharing, researcher visibility and academic promotion
- Much less frequent research outreach activity (e.g., blogging, science popularizations), or public science communication online



Research (institutional) policies in place

OS socially responsible research agenda
(Bartling & Friesike 2014)

- Disciplinary ethoi? (Becher & Trowler 2001)

Genre dynamics and implications

“Open Science practices **necessitate a reorganisation** of scientific work” (Thibault et al. 2023)

- scientists aligned their work with open access mandates
- support of digital tools and Internet resources
- respondents’ main discourse practices inextricably linked to OA journal article writing, *very/extremely important* both professionally and personally

“**Mapping patterns of genre systems** allows us to better understand genres as part of the larger social and communicative systems that determine the distributed work of a given activity system” (Andersen et al. 2014, p. 319)

- the larger social system establishes a hierarchy of genred texts which is aligned with social motives, specifically, the existing agendas mostly centred on research productivity and impact

(Digital) writing development

Strategies of content uptake, recontextualization, refocusing and repurposing across genres

- using an abstract to compose a social media post

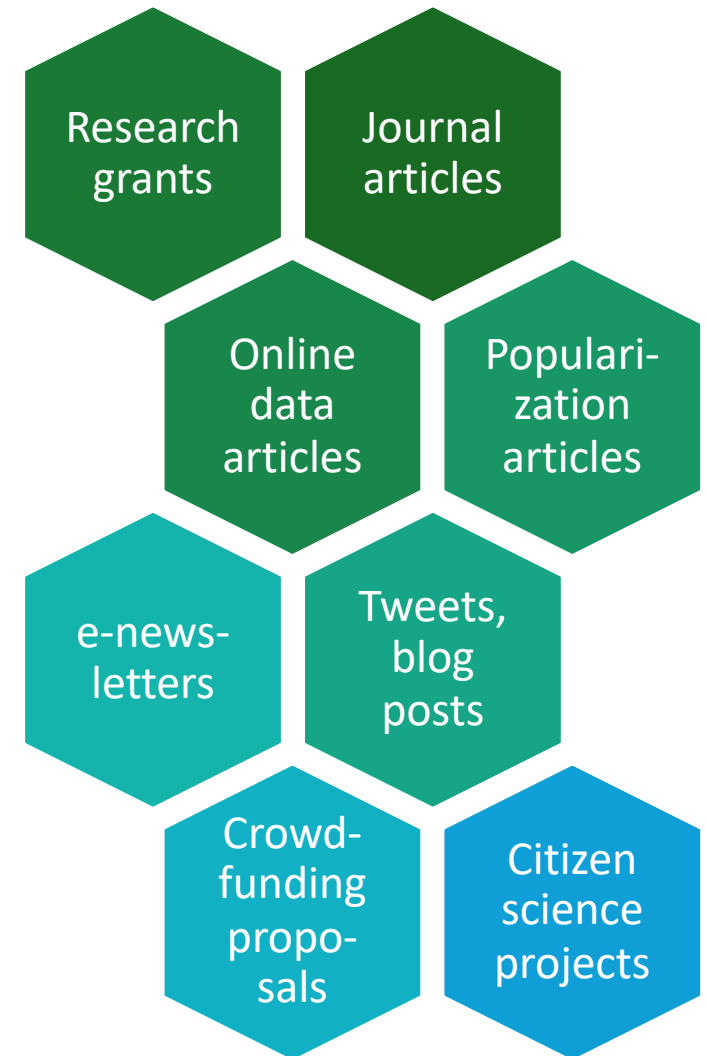
Attention to the scientific content **adaptation** to Internet audiences (Orpin 2019; Wickman & Fitzgerald 2019)

- tools for self-assessment of plain language use

Processes of **semiotic remediation** (Prior & Hengst 2010)

- multimodal composing an infographic based on a previously published work

Collaborative writing tasks integrating collaborative tools + Guidance on the ethical use of AI in the writing process



Acknowledgement

Digital Language and Communication Training for EU Scientists (DILAN), an Erasmus + project co-funded by the European Commission (2022-1-ES01-KA220-HED-000086749).

This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



**Co-funded by
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