Academic AI Literacy

Artificial Intelligence in Scholarly Writing, Editing, and Publishing

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Content

1. Introduction

Artificial intelligence (AI) has become an issue in need of attention in all sectors of society. AI, referred to in the Nordic countries as *artificiell intelligens* (Swedish), *kunstig intelligens* (Danish, Norwegian), and *tekoäly* (Finnish), is a general term used to refer to several different technologies that are based on machine learning. Coined in 1955 by an expert workshop led by John McCarthy, an assistant professor of mathematics at Dartmouth University, AI has been defined as systems that are capable of performing tasks that are normally reserved for humans.

During the past years, the breakthrough of the type of AI that is called generative AI (genAI) has made AI more tangible and accessible to all, but also an urgent ethical concern. Unlike traditional AI systems that realy on predfined rules, genAI uses techniques such as deep learning and neural networks to enhance its performance based on large datasets and generates new, original content based on the patterns and structures it has learned. GenAI thus refers to AI systems that have the ability to create new content, such as text, images, audio, or video, that is similar to examples provided to them during the training process.

In general, AI is described as a *disruptive technology*, which means that it has the potential to transform society across all sectors, from education to healthcare, and from transportation to agriculture. In the academy, it is anticipated to have effects on research, education, and collaboration by altering how we work in these domains, defined as the university's three assignments.

AI is also an *emerging technology*, meaning it is developing very rapidly, and there are many insecurities regarding its future development. In 2023, the world's tech leaders published an open letter, signed by almost 34,000 people, calling on all AI labs to pause the training of AI systems more powerful than GPT-4 for half a year, as they assessed that the development was getting out of control (Anonymous, 2023b). They appealed to the AI developers to "step back from the dangerous race to ever-larger unpredictable black-box models with emergent capabilities" (ibid.). AI is, therefore, generally characterised as a *dual-use of technology*, which means that it can be used both for benign and malign purposes with large-scale and partly unpredecented consequences (see, e.g., Boström, 2014).

AI is also connected to heavy industry investments, which makes it a major economic issue that is of interest in nation-states searching for global competition assets, and thus of major public interest – and even a technoeconomic fear. For users, it implies getting involved in commercial environments where they are always welcomed as potential paying customers. The technological development of AI is thus bound to economic interests, and the effects of AI may create remarkable biases: what kind of data is available, what kind of research is produced, and by whom.

Even if a general AI awareness can be regarded as an ingredient of a researcher's education, for academics, AI has, above all, immediate consequences for hands-on research work. AI appears mostly in the form of different tools available to assist a researcher in their work; AI thus refers in the narrow sense of the term to a diverse set of tools and applications that can be used for practical work in the research process. In addition, AI is a specific research area that has developed from being a matter for computer and data sciences to presenting urgent questions of ethics and epistemologies for philosopophy and social sciences (Mehan, 2022; Sergi & Popkova, 2020; Završnik & Simončič, 2023), as well as for media and communication sciences (Nah, 2023; Minoli & Occhiogrosso, 2023).

"It is no new dimension in academics' work to rely on different technologies."

This guidebook, written for especially doctoral students and junior scholars in media and communication sciences, deals with the academic AI literacy of a researcher in social sciences or, more particularly, a media or communication researcher. Academic AI literacy can, in this context, be defined as the ability to access, evaluate, and use AI-driven technologies and AI applications (cf. the established definitions of media literacy, such as Aufderheide & Firestone, 1993; Potter, 2022). Consequently, Long and Magerko (2020) suggest the following definition for AI literacy: "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (see also Ng et al., 2021; Cardon et al., 2023).

Academic AI literacy, in other words, entails a set of specific competences that an academic is expected to master to accomplish their work. It has connections to algorithmic literacy (Archambault, 2023), data literacy (Koltay, 2017), digital literacy (Dobson & Willisky, 2009), numeric literacy (Tønnessen, 2020), and computer or ICT literacy (Faillon et al., 2013). AI literacy is still less discussed in higher education in the context of academic students than in the more discipline-specific settings, such as in journalism education (Bhaskaran et al., 2024) or education of library and medical professionals (Koltay, 2017; Brown et al., 2020).

This guidebook approaches academic AI literacy from three specific directions, namely,

- *scientific editing and publishing*: AI in the editorial processes of producting research publications;
- *research communication*: AI in communication and outreach work;
- *productivity and professional development*: a question of learning related to an individual researcher's AI literacy and self-development.

Additionally, there are two related areas that an individual researcher encounters: AI in the actual research process and AI in university teaching. To address the former, AI in the research process, research designs and methodologies vary a great deal, and researchers thus have diverse needs regarding the use of AI. This is why I will not touch upon AI as a *methodological question* in the research process. Nevertheless, it must yet be highlighted that the questions of using AI within the research process and in reporting about the results are interrelated. Some solutions made within the research process can have significant consequences to the later stages of the process, such as reporting and communicating the results that are discussed here. This is why I address some aspects of the actual research process here, as well.

As for the latter, AI in pedagogy, AI can be identified as a distinct *pedagogical area* to which researchers must relate to, as many researchers are also involved in university teaching. The pedagogical area is large, ranging from teaching, supervising, and assessing academic writing to pedagogies and didactics of professional education, such as journalism education. It has connections to AI pedagogies in formal schooling, both of pedagogical frameworks of lower stages of education, and higher education, or university pedagogy. As the pedagogical area is a distinct area of its own, proposing another type of a question (how to teach about, with, and through AI?) than that of scholarly work, I will leave this area beyond the scope of this guidebook. In the future, there will nevertheless be a growing number of resources addressing AI pedagogies that can also benefit a researcher's professional development (see, e.g., Jaakkola, 2023b; Frau-Meigs, 2024).

I start by discussing the general preconditions for adopting and using AI from an individual researcher's perspective. Thereafter, I address AI in editing and publishing, in research communication, and in improving work management and productivity, respectively. In each section, I take some examples to illustrate tools available, but to live up to the abundance of different tools available, and those constantly emerging, I have compiled a longer list of examples included in the Appendix, based on the status quo of the time of writing (April 2024). As the landscape keeps changing rapidly, it is essential to learn to endorse the personal learning challenge discussed in more detail in section 2.3.

2. The AI Mindset

2.1 Why does AI matter for researchers?

It is no new dimension in academics' work to rely on technologies to support the work carried out in order to produce new knowledge: We use reference managers for keeping track of literature, qualitative and quantitative analysis software such as Atlas.ti, nVivo, and SPSS to support the analysis, and grammar aids to help find correct English expressions.

The novelty of AI implies that, compared to traditional technologies, AI technologies can process data more consistently, quickly, and accurately than humans, complementing and even surpassing human skills. AI can take over routine tasks and make working processes more efficient, and as AI systems learn from the data they receive, they can improve their performance over time. As the academic culture emphasises effectiveness and concurrence in publishing, the use of AI may appear as an attractive alternative for many, not only for departments seeking cost-effective solutions but also those who are early-career tenured – expected to be productive with yet no fully developed routines.

With AI, a real challenge is that we do not always know how the tools provided function and on which basis they generate the information. AI-driven tools are not very accountable,

Figure 1. The three stages of the writing process with regard to AI technologies.

1) Personal stage – a space of personal discovery (prompt: "researcher examining a computer"). 2) Back stage – a space of social discovery ("researcher and a team analysing results"). 3) Front stage – a space of public presentation ("researcher presenting results to an audience"). Images created with Playground AI.

and using accountable tools is a cornerstone of successful research work. Here, uncertainties largely revolve around the question of whether AI should gain some degree of a decision-making autonomy, or whether the ultimate responsibility for knowledge production could ever be trusted with a machine. The answer seems simple: no. Yet the practical solutions are more complex. If a human was previously using tools to support their own thinking, now the case may be that AI is using humans.

In conditions where the human excistence is enhanced by technological advancement and that have been described as post-human or transhumanist, the question seems to be truly philosophical, going deep into the formation of the epistemological, ontological, and ethical foundations of human interaction and being – whether intelligent agents, as autonomous learning systems, can be regarded as having a competence similar to a human, or a consciousness comparable to the agency of a human and their soul.

"AI tools have turned out to be efficient for plagiarism control."

How to deal with this situation? We can think of three interrelated spaces involved in the making of a scientific text, where the relationship to the technologies appear different: first, a space where the researcher needs to get into personal contact with the workings of AI tools to make basic decisions; second, a space where the basic decisions have been made and the writing process is conducted in interaction with the tools; and, third, a space where the researcher's work is accomplished and it is examined and assessed by others. The use of a specific AI tool or application is thus exposed from three directions: a personal, an interpersonal, and a public. In Figure 1, these are depicted as the personal stage, the back stage, and the front stage of the process.

In the personal stage, researchers, as users of AI-driven tools, actively seek and discover technologies but only see the surface of a software or application. Based on diverse considerations, the researcher determines to use a tool and interact with it, or many of them, and to bring them to the back stage. The researcher enters the front stage by publishing their work, or presenting it in another way, they need to be capable of explaining what happened in the back stage, based on experiences and understandings from the personal stage.

All these stages imply a different relationship to the technology. In the personal stage, there are questions that are ethical and pragmatic: to use or not to use, and on what basis? Many questions can be solved by trial and error, or experimenting and testing what actually works and what does not. In the back stage, research is formed in collaboration with peers with the focus on the scientific text, and it is the space where solutions regarding the human action need to be made, based on findings from the personal stage. In the front stage, as an author of a paper, the researcher needs to be capable of defending the solutions made in the back stage, based on an informed reporting of what has been done. Reporting needs to be honest and detailed enough to give the audiences keys to assess the success of the outcome – and to make the research transparent, reliable, and accountable.

Some decisions regarding the implementation of AI are based at the organisational level, and an individual has no other choice than to comply. Thus far, AI-driven tools have turned out to be efficient within universities which use them for plagiarism control. Already for years now, universities are running student theses through plagiarism detection tools such as Turnitin, Urkund, or Copyscape to ensure that documents are original and properly sourced. In a similar fashion, editors of scientidic publications scan manuscripts with these tools before proceeding to publication. In addition, there are many choices related to the more practical level where an individual researcher has the power – and the responsibility – to choose. At this level, general awareness of AI is needed to make informed decisions.

2.2 Ethical considerations

The most prominent reservations concerning the use of AI for individual researchers most probably deal with the lack of widely established ethical frameworks – and related best practices. Many researchers fear that with unpurposive uses, scholars can do more harm to the trustworthiness of research than benefit from the tools available. As the consciousness of the presence of AI in the research process and, in particular, that of genAI, is still very young, there are no widely established practices to report the uses.

At the policy level, the European Commission (2024b) released the first version of *Living guidelines on the responsible use of generative AI in research* in March 2024. Developed in collaboration with the European Research Area countries and stakeholders, the guidelines usher researchers to refrain from using genAI tools in sensitive activities such as peer reviews or evaluations and use genAI respecting privacy, confidentiality, and intellectual property rights (European Commission, 2024a).

Consequently, in the long run AI can become a threat for research processes if it is not used with proper ethical commitment, that is, careful consideration and ambitions for transparency. It is essential that editors and readers of scientific publications can trust that the information is validated by humans and the responsibility is not left to machines. Messeri and Crockett (2024) warn us that the proliferation of AI tools in research risks introducing a phase of scientific inquiry in which we produce more but understand less. Even if AI can improve productivity and objectivity by overcoming human shortcomings, it can also result in the production of "scientific monocultures, in which some types of methods, questions and viewpoints come to dominate alternative approaches, making science less innovative and more vulnerable to errors" (ibid., p. 49).

Obviously, the methods of reporting the uses need to be developed. Uses of AI technologies are most likely expected to be addressed in the data management plan of research projects, and some journal publishers have introduced guidelines for editors and authors. It is up to journals and funders to ensure that the disclosures about AI use will become a reality.

In student work at the university, it has become a good practice to ask students to produce a work report that delivers a meta insight into the working process. Normally, these kinds of reports are used in journalism education or teacher's education in the form of learning diaries or post-publish essays to increase and verbalise reflection, which is an essential part of the learning process. It may also be a good way to increase the transparency of the research process to add an AI statement to the actual research publication, in a similar way that there are ethnical statements and diversity statements.

Another challenge concerns the confidentiality and proprietary rights of research materials. GenAI tools may use input data for training or other purposes, which can potentially violate the confidentiality of the editing and peer-review process for an article, the privacy of authors and reviewers, and the copyright of the manuscript under preparation. As long as we do not know what will happen with the data that is uploaded to genAI tools, a safe use cannot be guaranteed. For example, Elsevier (2024) declares in its editorial policies that editors should not upload "a submitted manuscript or any part of it" or any letters from the editors into a generative AI tool, "as this may violate the authors' confidentiality and proprietary rights and, where the paper contains personally identifiable information, may breach data privacy rights".

"Authors should regard the outcome of AI-assisted processes as raw material."

All AI tools are not free of charge, even if trial and free-of-charge versions with in-app purchases are often available. In other words, the use of AI is likely to cause additional costs to researchers. Scholars have also highligted the risk of an imbalance in the accessibility of AI tools between high- and low-income countries, if the software incurs regular costs (Salvagno et al., 2023). There is also an obvious risk of inequity between senior staff and project-based or affiliated researchers at universities in this respect.

Researchers looking for knowledge about AI typically come across with macro-level frameworks for production of AI. The questions about good AI (Dodhia, 2024), fair AI (Robert et al., 2020), benign and malign AI (Crowder, 2023), and friendly AI (Yudkowsky, 2001) are relevant for societal discussion where the elements of accountable production and use must be identified, and also for those who produce AI. For

ordinary users, a more pragmatic approach of focusing on the functional consequences of the uses appear as the most relevant. Instead of conforming to an essentialist view on AI as "good" or "bad", we should be able to analyse the conditions of power that each use generates (see Kalluri, 2020).

As AI systems are both visible (applications are marketed as "AI tools") and invisible (systems are using AI technologies without the users noticing it), it may be difficult for a user to identify moments when AI technologies are at play. The choices regarding the uses of genAI are more conscious, and it is more feasible to describe how these technologies affect the outcome of the work produced by an interplay between technology and a human. Every researcher is thus expected to take informed decisions regarding the generative tools they select to use, and be able to report on their role in the process, of which the researcher is in control.

2.3 A personal learning challenge

Whether wanted or not, AI has become a societal and professional question that everyone should relate to. With the extent to which AI is becoming part of our everyday lives, general AI awareness is part of citizenship orientation (see, e.g., Kokuryo et al., 2020; Schneider, 2019).

As citizens in their lives, researchers should be conscious about the potentials and pitfalls of AI in their work as editors, peer reviewers, educators, and public speakers, but not everyone needs to use AI in their work. The question is similar to the considerations regarding the use of referencing systems: If you have never used EndNote or Zotero and still accomplished the writing process of several studies, you can conclude that there is no need to introduce the tool in your everyday work. Qualitative analysis can even today be conducted with the help of papers and coloured pens, instead or making use of dedicated software. It is up to an individual researcher whether, first, to adopt tools for use or not, and, second, which tools. As long as the employer or project administrator does not expect an employee to use a specific tool, the decision must be weighed against the assets and requirements.

Many AI tools are made user-friendly and easy to use, which makes the learning curve low. For a researcher, it may be a rewarding challenge to experiment and try out different tools and see what works – and what does not. In many cases, the question is about personal needs and preferences: What works for a colleague may not necessarily suit you.

On the other hand, the permanent adoption of a new tool, notwithstanding its user-friendly interface, entails a threshold, particularly regarding its integration into daily routines. Many AI tools require that materials are pre-structured before they can be uploaded into the system. It is often easier to continue with established offline routines than to introduce routines for new preparation methods for the use of a tool, irrespective of the user-friendly nature of the tool.

Both the adoption and uses of different tools and technologies involve knowledge and skills that can only be developed through a direct contact with the technological applications, which requires hands-on experience (Marangunić & Granić, 2015). Indeed, over half of the Nordic academic journalism educators indicate that they learn most about AI with a learning-by-doing approach – experimenting through trial and error – and from their peers and colleagues, and that these two sources are the most important sources of learning about AI, followed by journalistic coverage (Jaakkola & Wiik, 2024, forthcoming).

Nevertheless, in societal debates, a typical reaction to media that are assessed as potentially harmful or challenging is to ban their use – for example, recently, the use of smartphones in schools (UNESCO, 2023). However, in the long run, it might be more fruitful to encounter the tools and technologies, develop common rules of practice and discuss the harms and disadvantages, instead of eliminating them from sight. In addition, the acquired experience, with the tacit knowledge that is involved, is accumulated capital that assists in the adoption of new tools: The more one exposes oneself to different tools and technologies, the easier it usually becomes to understand new tools, functions, and features.

Using different tools means developing an active relationship with the rapidly changing world. Best practices, examples, case studies, tests, and customer product reviews may help in the assessment of which tools are worth trying. Here, the power of collaborative learning among colleagues and peers may be an asset. Researchers can rather easily form learning communities across organisations and countries to try tools and share their experiences, which benefits all within the same discipline.

3. Learning Co-Intelligence

A frequently asked question regarding AI in the academy is about the competences that are required – or, in fact, what new competences researchers and aspiring researchers are expected to adopt. Accordingly, the question deals with the competence and skill requirements that the curricula, both in graduate and post-graduate education, should contain. As the applied fields of AI are still nascient, there is neither a consensus on what "AI literacy" exactly means in the academic context nor, consequently, any established best policies or practices.

However, we can depart from the assumption that the diverse applications of AI necessitate an *adjustment* in thinking and behaviour in all sectors of academic life, including the university's three assignment areas. This adjustment is about developing a collaborative, reflective and critical relationship to AI systems – technologies that are able to act autonomously and enhance their performance across time. This relationship entails new ingredients in all elements of competence – knowledge, skills, attitudes, and behaviour (Schneider, 2019).

The novelty in this competence frame is perhaps best captured by Mollick (2024), who describes the new AI literacy as a way of learning *co-intelligence*. According to Mollick, we, as human beings, need to "align with the alien" that takes the alternating roles of a co-worker or assistant, coach, or companion. The collaborative relationship is to be incorporated in the existing professional identities, cultures, and routines of researchers and other practitioners without compromising on their professional integrity.

Mollick (2024) outlines four principles to nurture co-intelligence: 1) Always invite AI to the table, that is, make explicit what the AI is, how it works, and how it eventually affects the collaboration and its outcome; 2) Be the human in the loop, that is, never forget that AI is artificial and retain your control; 3) Treat AI like a person that "learns", "thinks", and "understands", but only metaphorically, so that you need to facilitate its skills development; 4) Assume this is the worst AI you will ever use, that is, be prepared for the continued growth of capacity of the system.

AI competences are thus less about how to push a button or produce a code that operates a machine, and rather about dealing with a constantly developing and living agent that yet is not a living organism. The initial ideas of integrating AI into the working teams of researchers (see section 5.1) have involved the misunderstanding of holding intelligent agents for human-like team members, based on their outstanding performance. The human-like character of AI is often reinforced by referring to chatbots or writing assistants with human names (e.g., Claude or Siri), and the anthropomorphisation has also been a prevalent narrative in popular culture, for example, in sci-fi literature and films (Jaakkola, 2023).

To deal with different applications of AI, the human needs to adopt new skills, of which the most novel and prevalent are in the area of prompt engineering. In general, in order to employ AI tools, ordinary users do not need to acquire specialised knowledge about coding. Yet to be able to communicate with AI models, users need to know how to craft effective, clear, and iterative instructions for a conversational AI to make it provide specific information. Writing prompts has become especially relevant after the emergence of genAI, which works based on such requests. At the same time, the prompt writer needs to be able to critically interpret the outcome generated by AI and take control of how to use it.

OpenAI's (2024) prompt engineering guide offers advice on formulating instructions for large language models such as ChatGPT and evaluating their output. The pieces of advice include writing instructions that are as explicit as possible, possibly with examples and information on the desired length of the output text, providing the language model with reference texts, splitting complex tasks into simpler sub-

tasks, and using external tools if a task can be conducted more reliably by a tool other than a language model.

On platforms where prompts used to generate specific material are openly shared, such as on Playground AI, a free-to-use online image creator, users can efficiently learn from other users how they have harnessed the potential of AI and understand how the tools work.

4. AI in Writing and Editing

AI tools can be used for writing and editing in different ways. For both processes, a central objective is to find a structure and an expression for ideas generated in the research process, to be published in an appropriate channel. In this respect, the publication channels play a central role for the whole editing process, and it might be recommendable to determine the journal or publisher before starting to write the manuscript (for journal finders, see the next section).

AI can assist authors not only by suggesting appropriate journals for an article, but also by finding and managing references, processing reference literature and data, and conducting a data analysis. Above all, it can be of great assitance in the writing process, for example, by identifying ideas and concepts, defining terms and clarifying expressions, correcting grammar, and enhancing expression. Further, AI tools can help structure an article and match it with the standards of a selected journal. AI can also help construct an abstract and a list of references after the manuscript is written, or translate text excerpts. Moreover, with AI, authors can create tables, visualisations, and illustrations for an article.

As many students find it difficult to bridge the data collection and writing process, or to distinguish between content (what they want to say) and structure (in which order to put it) (Shah et al., 2009), article structuration tools may help. Long-form article generators such as Simplified can solve such problems, or at least pave the way for an appropriate article structure.

In all cases, authors should regard the outcome of AI-assisted processes as raw material or a point of departure rather than as the final result that can be published as such. AI is likely to make mistakes, hallucinate (fabricate information that is false), or take the work in directions not intended by the author. AI does not take into account the cultural context, and it may not understand the need to explain certain concepts. AI may choose wordings that are not in line with previous research or the sholarly tradition in question.

To illustrate the possibilities, we can envision an imaginative process of manuscript preparation with AI tools. The author, who is preparing a manuscript based on thematic interview material, explores references in Semantic Scholar (alternatives: Elicit, Copilot, Scite). She has transcribed the structured theme interviews with Otter.ai (alternatives: Rev, Trint, Whisper AI) and translated the excerpts used in the article with DeepL Translate (alternatives: OpenL Translate, Wordvice AI, QuillBot), enhancing some expressions to capture the style and mode of the original expressions. In the description of the methodology, she addresses the uses of the tools.

In her writing, she explores different expressions with the help of ChatGPT and Rytr AI, but sends the final manuscript to proofreading conducted by a human being. However, when she receives the proofread version from the international proofreader service, she pays attention to the large number of edits that have been made; with a more careful examination, she notices that some of the terms given in her national language have been changed, which makes her recognise that the proofreading has been AI-assisted. She contacts the company and is granted the possibility for a second round of proofreading, which comes back as correct. She, pleased with the fact that she was able to detect AI use, discovers that the manuscript is ready for submission.

5. AI in Publishing

Journal finders – or journal suggestors, journal recommenders, journal selectors, or manuscript matchers – are services for authors to find the optimal publication channel for a manuscript. They are offered by big international publishing houses running several peer-reviewed journals or independent ones such as Bison, powered by the Technical Information Library (TIB) in Hannover, Germany, that retrieves information from the Directory of Open Access Journals (DOAJ) (Jaakkola, 2023a).

Journal finders request the author to fill in information about the article manuscript that the author intends to submit: the title, abstract, and keywords. As the results can vary a great deal (see an experiment by Jaakkola, 2023a), it is advisable to cross-use services and browse journal listings in journal databases (e.g., Web of Science, DOAJ, or national databases) manually before reaching a decision.

Editors of scientific publications are also using AI tools. AI technologies can assist, above all, in providing quality control for submitted papers, finding suitable reviewers for submitted papers, reviewing, and review evaluation. Therefore, authors should be prepared for their material to be processed with the help of AI, and in the case that it has occurred, they should be notified of that.

The practical question for authors is, when submitting their article that may be to some extent AI-assisted, how to report on the uses of AI. While authorship cannot be claimed, the role of AI should be mentioned in some way. In Lund and Naheem's (2024) analysis of 300 journals' editorial policies, 18 percent of publishers did not request a mention about the uses of AI in any special section, but 44 percent requested it in the methods section and 25 percent in the acknowledgements.

The first texts where AI has been used in scientific publications have actually been journal editorials, written with a certain level of playfulness and jest in tone (O'Connor & ChatGPT, 2023; Salvagno & Taccone, 2023; Aghemo et al., 2023). The role of ChapGPT has been addressed in the acknowledgements section, for example: "The authors would like to acknowledge ChatGPT (GPT-3.5) for participating in the writing of the manuscript" (Aghemo et al., 2023).

5.1 AI – not a co-author

Initial discussions about AI technologies in scientific publishing have to a great degree dealt with the question of whether AI can qualify as a co-author or only be considered as background support. Here, however, the early experimentors encountered the fallacy of anthropomorphisation.

Polonsky and Rotman (2023) concluded in their study – in which they also consulted ChatGPT as a source – that AI tools have or will have the ability to meet the four conditions specified in the International Committee of Medical Journal Editors (ICMJE, 2022) recommendations for authorship (the so-called Vancouver Protocol). They argued that even other guidelines such as the Contributor Roles Taxonomy (CRediT, 2024; Elsevier, 2023) and The Australian Code for the Responsible Conduct of Research (Australia Universities, 2018) are generally aligned with the ICMJE guidelines.

ICMJE (2022) identifies four criteria for authorship. According to them, authorship is based on 1) substantial contributions to the conception or design of the work; 2) the acquisition, analysis, or interpretation of data for the work; 3) drafting the work or revising it critically for important intellectual content; and 4) final approval of the version to be published (ICMJE, 2022). CRediT (2024) extends the conception by identifying 14 further possible contributor roles related to the process of producing scholarly outcomes: conceptualisation, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resource management, software management, supervision, validation, visualisation, writing of the original draft, and writing by reviewing and editing the manuscript.

Further relevant guidelines for publishing include those by the Committee on Publication Ethics (COPE), which many publishers refer to. The COPE resources include guidance and best practices for authorship and contributorship, as well as for dealing with research misconduct and alleviation of intellectual properties, and thus can be used as a support when arguing for ethical and accountable AI use in the editing process.

In 2023, in line with Polonsky and Rotman's (2023) conclusions, the journal *Nurse Education in Practice* published an editorial where ChatGPT was marked as a co-author (O'Connor & ChatGPT, 2023). However, after a discussion (Koo, 2023) and a post-publication review (Seiegerink et al., 2023), it was asserted that an AI tool cannot be attributed with authorship. The central argument was that if authorship of an article confers accountability

for the content of the work, then large language models, irrespective of their level of complexity, cannot be held accountable for the content of the work. As a consequence, the journal published a corrigendum (O'Connor, 2023) to announce that the decision to mark ChatGPT as a co-author was erroneous, and the author details were corrected.

Later studies and statements have strongly confirmed that AI does *not* qualify as a co-author (Athilingam & He, 2024; Stokel-Walker, 2023; Anonymous, 2023b; Thorp, 2023; Lund & Naheem, 2024). "Synthetic scholarship" is rather a futuristic ideal; in reality, human scholars interact with intelligent agents and acknowledge the role of AI in the methods or acknowledgements section, or in a special section assigned by the journal, in as detailed a manner as required to arrive at an overall assessment of the impact of automatisation on the process.

At the time of writing (spring 2024), all the large international journal publishers have included author guidelines with regard to the uses of genAI in their editorial policies. Springer Nature (2024) claims that the use of a large language model such as ChatGPT "should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript". Similarly, Cambridge University Press (2024) outlines that "AI use must be declared and clearly explained in publications such as research papers, just as we expect scholars to do with other software, tools and methodologies". Elsevier (2024) states that authors are allowed to use genAI and AI-assisted technologies "in the writing process before submission, but only to improve the language and readability of their paper and with the appropriate disclosure". Edward Elgar (2024) explicitly clarifies that the policy "does not refer to spell and grammar checking tools (such as Grammarly) which may be used without acknowledgement".

Guidelines are also provided by Routledge (Taylor & Francis, 2023), Palgrave MacMillan (2024), Sage (2024), De Gruyter (2024), Emerald (2024), MIT Press (2024), Wiley-Blackwell (2024), John Benjamins (2024), and Frontiers/MDPI (2024) (for a systematic overview, see Perkins, 2023). The publishers note that they are monitoring ongoing developments in the AI area closely and will adjust or refine their policies as appropriate.

5.2 AI in peer reviewing

There is an emerging consensus in the field of scientific publishing on the practice of not using genAI in peer evaluations. Peer reviewers and scientific editors may use AI tools for checking grammar and spelling, detecting plagiarism, and screening article formalities such as references, but not for the general assessment, which is the fundamental purpose of the peer review, and also the editorial review and subsequent decision. Another concern is the risk of disclosing confidential information and infringing copyright if genAI tools are involved (see European Commission, 2024b).

Still, some researchers have been more optimistic and seen technical potential in AI-assisted reviewing of papers (Checco et al., 2021; Kousha & Thelwall, 2024). According to the optimistic visions, AI assistance could minimise potential biases caused by subjective preferences and bring efficiency to the peer review process, which is, being a voluntary and unpaid additional responsibility, commonly perceived as an undervalued labour by academics.

Letting large language models process and assess a manuscript and write the report can, indeed, feel like a tempting alternative. The result of such a use is, however, the increase of fabricated peer review reports, which has been observed to be on the increase (Piniewski et al., 2024). As a consequence, scientific publishers have increasingly shown dedication to preserving peer reviews as a domain exclusive to human experts who can crtically consider all aspects of a manuscript. Elsevier (2024) describes the situation as follows:

> Managing the editorial evaluation of a scientific manuscript implies responsibilities that can only be attributed to humans. Generative AI or AI-assisted technologies should not be used by editors to assist in the evaluation or decision-making process of a manuscript as the critical thinking and original assessment needed for this work is outside of the scope of this technology and there is a risk that the technology will generate incorrect, incomplete or biased conclusions about the manuscript.

Wiley-Blackwell (2024) outlines that genAI tools "should be used only on a limited basis in connection with peer review": Tools can, according to the guidelines, be used by an editor or a peer reviewer to improve the quality of the written feedback in a peer review report, but the use must be transparently declared upon submission of the peer review report.

As a receiver of a peer review report, a researcher should be be able to recognise a false peer review report and contact the editor if there is such a suspicion. When writing peer review reports, it is acceptable, as in any content creation, to use AI tools for assistance, but the final assessment should be a human effort.

6. AI in Research Communication

The possibilities genAI offers for post-publishing communication are abundant, as the AI-driven tools for content creation are many (see the Appendix). The most typical needs of an author include the creation of different presentation materials to communicate about the original research, as well as the elaboration of supportive materials and events that have a popularisation and outreach aim. Both of these activities are inherent in the researcher's regular work, often subsumed under the university's third assignment of societal collaborations.

6.1 Presenting research

One of the most time-consuming things for authors is the creation of presentation materials for the academic and non-academic conferences where researchers are expected to present their work.

The first generation of genAI tools have brought about several services that offer automated design of presentation slides and videos based on uploaded materials. For example, Beautiful.ai creates slides of text material. Presenters can benefit from the automatic creation of illustrations based on the thematics, and an eye-pleasing design, which would normally take time for the presenter. Presenters can also choose ready-made PowerPoint templates with integrated automated design for the benefit of those compiling presentations. One option is to create AI-generated illustrations in separate AI image generation services such as Midjourney.

One fruitful feature is the development of subtitles for videos, as well as the transcription and translation of subtitles. In academic events and meetings, authors can receive great help from live transcriptions and live translations.

In sum, genAI can make the presentation possibilities for a researcher much more diverse and multimodal, and therefore more approachable and inclusive. Content creation such as the making of audioclips or videos has never been, and is not going to be, part of the core competence of academics, but it will be made easier with the help of AI. When the generation of presentations no longer requires as much time as before, researchers can better focus on the core content of the messages they want to mediate to different target groups and wider audiences.

6.2 Creating supportive materials

To gain outreach, authors typically need to produce several texts representing different genres, such as press or media releases or policy briefs. These are needed to communicate to different target or audience groups, often to those who are not primarily interested in or capable of reading original pieces of research. The creation of supportive materials also requires that researchers consider the applicability of the ideas put forward in the original research.

Chatbots and writing assistants can help write a press release for scientific texts. If the text is already published, the risks in uploading materials to genAI tools are rather low. Researchers can, for example, prompt a chatbot to write a 250-word press release or policy brief based on an academic text provided. This text can form the basis of shaping the final text.

Research authors can also generate automated audio products of their research outcome. Services such as Deepgram's AI Voice Generator, Fliki, Veed.io, Murf, Speechify, or Reseemble AI enable the cloning of one's voice, and a synthetic voice can be set to read articles or other scientific texts, possibly as a voice-over to a video or as a podcast.

Adding multimodality to presentations shared online means diversifying the ways of communication and thus providing more inclusive access to the materials.

Presenters can also generate videos and animations based on their material. For example, OpenAI's models Sora and Pika provide a possibility to generate videos based on text prompts, and services such as Animaker AI, Deepmotion, and Runaway generate animated videos. The possibility to show illustrating and attention-catching videos with a scientific or research-based message may be an attractive way of communicating, especially for those who are targeting younger people or people with learning disabilities, for example.

6.3 Social media communication

The expectations of researchers to communicate openly about their ongoing and published research, and getting into a dialogue with audiences and other stakeholders of research, have increased. For the purposes of keeping contact with external or non-academic audiences, social media has been regarded as an appropriate channel. Besides keeping a dialogue with audiences, researchers may want to popularise their research, which means that they need to produce new content in blog posts, video, or audio – and also find or set up a channel for such communication, for example, a blog or YouTube channel.

However, the timely resources needed to produce blog posts, tweets, photo or video content, interviews and dialogues, live sendings, or similar, may discourage many from becoming a public figure. Also, many researchers make the decision to take care of their public duties through professional mass media, that is, by letting journalists do the mediation with interviews and other types of coverage, rather than engaging themselves.

In this challenge, AI tools that generate social media–compliant content can provide assistance. Even in these cases, the content written by AI must be regarded as raw material rather than ready-to-publish texts. Nevertheless, chatbots can provide ideas about the adaptability of research findings, which can lead to ideas to touch upon in personally crafted posts – or blog post assistants and image creators can do half the work.

7. AI for Personal Productivity

Personal productivity tools are applications that are designed to help individuals manage tasks, organise information, prioritise activities, and increase efficiency in their personal and professional lives. These tools, designed both for professional and personal lives, typically include features such as to-do lists, calendars, reminders, note-taking capabilities, project management functions, time-tracking, and goal-setting – but also self-tracking and -monitoring, self-improvement and -development, or even well-being and self-care.

The promise of influsing AI-powered tools into workflows offers improved efficiency. However, the AI-isation of work processes and everyday lives is highly personal and dependent on individual preferences, and it can mean very different things to different individuals, regardless of the research work they are conducting. Even if more attention has been dedicated to the well-being aspects of academic environments lately (see, e.g., Caleb & Barden, 2019), many young researchers still feel alone. At the same time, we should be aware of the consequences of increased productivity expectations, which may lead to higher productivity norms and concurrence. Even in pre-AI times, academic students around the world have reported experiencing challenges with regard to their mental health, and young researchers are suffering from stress, anxiety, and motivational problems (Di Giacomo et al., 2024).

To take some examples of productivity tools relevant for academics (see the Appendix for examples), AI calendar management can help schedule meetings and make the choice of teammates smoother. Project and writing teams can streamline their appointment scheduling by letting a calendar assistant such as Scheduler AI or the human-like virtual assistant Clara choose the appropriate time by browsing online calendars.

As finding time to write is one of the most central everyday challenges for researchers, tools for time and task management are typically high on reseachers' lists. Goal-setting in writing and manuscript management can be supported by AI-powered to-do list generators that turn goals into achievable milestones and track progress.

Finally, AI applications can also guide researchers in the longtime dilemma of distinguishing between work and leisure. AI time-tracking tools that automatically record the time researchers spend on tasks and projects provide an alternative to manual timesheets and give a realistic and accurate overview of working hours.

8. Conclusion

The uses of AI for different purposes in the academy constitute a complex question that is likely to be discussed, debated, studied, and tested in the years to come. AI technologies, also when it comes to their academic applications, are still in their infancy, and only the initial ethical frameworks have been formed.

Publishers and funders, as well as other actors working with the infrastructures of research, have a high responsibility to follow the development and call for ethical regulation and frameworks that provide clear guidelines for those conducting research. As they are possibly also part of the AI development, they have the responsibility to promote AI use that is accountable, reliable, and fair.

The decisions and solutions that authors have at their disposal deal with selecting or rejecting tools for use. When using AI-driven tools, researchers must keep in mind that AI is not a substitute for human critical thinking and action. When finally entering the front stage and presenting their findings, it is essential for researchers to clarify which roles AI technologies have had in the human–technology interplay that has generated new knowledge.

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Appendix

AI Tools for Researchers

This list of AI tools, with a focus on generative AI, is based on the status quo of April 2024. Tools are mentioned in alphabetical order under each heading. To find more tools and updated information on them, there are many databases that collect AI tools, such as TopAI.tools (https://topai.tools) and Supertools (https://supertools.therundown.ai). In addition, many academic AI influencers, such as Mushtaq Bilal from the University of Southern Denmark, regularly collect and curate lists of AI tools and send out newsletters to subscribers. Some tools are free to use, but some require payment, with free trial periods.

Tools for finding publications

Consensus
https://consensus.app
Search engine that helps find answers to questions, based on research

Research Rabbit
https://www.researchrabbit.ai
Helps find research related to a topic or an author

Scite
https://scite.ai
Retrieves citations to published papers

Reading aid

ChatPDF
https://www.chatpdf.com
Helps read and analyse a journal article

GPTZero
https://gptzero.me
Detects texts that are generated by large language models

Journal finders and recommenders

Scientific publishers

Elsevier Journal Finder
https://journalfinder.elsevier.com

Sage Journal Recommender
https://journal-recommender.sagepub.com

Springer Journal Suggester
https://journalsuggester.springer.com

Taylor & Francis Journal Suggester
https://authorservices.taylorandfrancis.com/publishing-your-research/choosing-a-journal/journal-suggester/

Web of Science Match Manuscript
https://mjl.clarivate.com/home

Wiley Journal Finder
https://journalfinder.wiley.com/search?type=-match

Open software

Bison
https://service.tib.eu/bison/

Edantz Journal Selector
https://www.edanz.com/journal-selector

JournalGuide
https://www.journalguide.com/

Chatbots

AcademicGPT
https://academicgpt.net

ChatGPT
https://chat.openai.com

Copilot
https://copilot.microsoft.com

Google Gemini
https://gemini.google.com

Transcription

Fireflies
https://fireflies.ai

Airgram
https://www.airgram.io

Krisp
https://krisp.ai

GoodTape
https://goodtape.io

Otter.ai
https://otter.ai

Content creation

Copy.ai
https://www.copy.ai

Jasper
https://www.jasper.ai

Texta AI
https://texta.ai

Summary generators

Elicit
https://elicit.com
Explore references

SciSummary
https://scisummary.com/
Summarises scientific articles

Scholarcy
https://www.scholarcy.com
Summarises articles, reports, or book chapters from Word or PDF documents

Semantic Scholar
https://www.semanticscholar.org
One-sentence summary of an article

Article checkers

Simplified
https://simplified.com/ai-article-writer
A long-form article generator

Typeset.io
https://typeset.io
Provides manuscript templates and automated formatting tools

Grammar checkers and proofreaders

HIX.ai
https://hix.ai
Proofreader

Quillbot
https://quillbot.com
Writing and language enhancement features

Scribbr.com
https://www.scribbr.com
Proofreader

Trinka
https://www.trinka.ai
Helps with grammar and language correction

WPS AI Spell Check
https.//wps.com
Proofreader integrated in Office

Rewording tools (paraphrasers)

Grammarly
https://www.grammarly.com
Writing assistant

Jenni AI
https://www.jenni.ai
Writing assistant

Paperpal
https://paperpal.com

Rytr AI
https://rytr.me
Writing assistant

Wordtune
https://www.wordtune.com

Wordvice AI
https://wordvice.ai
Includes an academic proofreader

Writesonic
https://writesonic.com

Writefull Academizer
https://x.writefull.com/academizer
Makes an informal sentence appropriate for an academic text

Image generation

DALL·E 3
https://openai.com/dall-e-3

Midjourney
https://www.midjourney.com/

NightCafe Creator
https://creator.nightcafe.studio

Playground AI
https://playground.com

Stable Diffusion
https://stablediffusionweb.com

Slideset generation

Beautiful.ai
https://www.beautiful.ai

Decktopus
https://www.decktopus.com

Slidesgo
https://slidesgo.com

Voice and music generation

AIVA
https://www.aiva.ai
Music maker

Murf
https://murf.ai
Voice generator

Splash Pro
https://pro.splashmusic.com
Music maker

Video creation and editing

Descript
https://www.descript.com

Sora
https://openai.com/sora
Text-to-video model by OpenAI

Wondershare Filmora
https://filmora.wondershare.com

Runway
https://runwayml.com

Task and project management

Asana
https://asana.com

Any.do
https://www.any.do

BeeDone
https://www.beedone.co

Motion
https://www.motion.ai

Taskade
https://taskade.com
Goal-setting generator

ProofHub
https://www.proofhub.com
Project management and collaboration tool offering task and document management features

Scheduling

Clara
https://claralabs.com
A human-like virtual assistant that suggests meeting times in e-mail, having studied calendars

Clockwise
https://www.getclockwise.com

Reclaim AI
https://reclaim.ai

Scheduler AI
https://scheduler.ai