

PAPER

The Potential of Generative AI in Scientific Publishing: Exploration of Researchers' Journeys from Draft to Publication

Meshari Rizqallah
Alsulami , Fahad Saleem
Al-Hafdi , Waleed Salim
Alhalafawy  

King Abdulaziz University,
Jeddah, Saudi Arabia

welhalafawy@kau.edu.sa

ABSTRACT

Recently, Generative AI (GenAI) has become one of the tools that can play a tangible role in bringing about fundamental transformations in the scientific publishing (SP) scene. Based on the necessary potential that GenAI offers, it has become necessary to conduct studies that explore the impact of these capabilities on the SP process. Consequently, this study aims to reveal how GenAI affects the stages of the SP process, starting from the preparation stage, through the submission and processing stage, and reaching the publication and dissemination stage, by studying the experiences of some researchers from the moment of writing the initial draft until reaching the final publication stage. This study implements a qualitative approach, depending on the phenomenological method to understand researchers' subjective experiences with GenAI. Semi-structured interviews were conducted with eight researchers who were carefully selected according to criteria that confirm their research excellence and actual use of GenAI tools in their research. All interviews were conducted in a context that concentrated only on the ethical practices associated with the use of GenAI in SP. The results identified the potential of GenAI in three main axes of SP: (1) the preparation stage, (2) the processing and submission stage, and (3) the publication and dissemination stage. In the preparation stage, the results showed the role of GenAI in generating ideas, contributing to the development of research relationships, and helping to improve the quality of textual, digital, and graphic formulations. Regarding the submission and processing stage, the results showed the possibility of using GenAI as a GenAI editor to evaluate research before submission, select appropriate publication sources, and improve communication with editors and reviewers. Finally, in the publication and dissemination stage, the results showed the role of GenAI in increasing the dissemination of scientific knowledge by creating summaries in multiple languages and promotional content suitable for social media platforms and analyzing the impact of research after publication. The study provides recommendations for researchers, research institutions, and publishers to make the most of GenAI while keeping quality standards and scientific ethics.

KEYWORDS

Generative AI (GenAI), scientific publishing (SP), draft, publication

Alsulami, M. R., Al-Hafdi, F. S., Alhalafawy, W. S. (2025). The Potential of Generative AI in Scientific Publishing: Exploration of Researchers' Journeys from Draft to Publication. *International Journal of Interactive Mobile Technologies (iJIM)*, 19(21), pp. 77–106. <https://doi.org/10.3991/ijim.v19i21.56133>

Article submitted 2025-04-20. Revision uploaded 2025-08-02. Final acceptance 2025-09-15.

© 2025 by the authors of this article. Published under CC-BY.

1 INTRODUCTION

Scientific publishing (SP) is a notable discipline in the enhancement of human societies for its contribution to providing objective understanding based on tangible evidence [1]. SP always seeks to find the best possible solutions through systematic investigation of all the problems it addresses [2]. It also lets the research community exchange ideas and accessible results [3]. Besides, SP and its ability to influence in terms of dissemination and the number of citations contribute to improving the ranking of universities according to several international rankings, such as the QS ranking and the US News ranking [4–6]. Recently, generative AI (GenAI) has emerged with the potential to generally support the various tasks of higher education faculty [7–9] and, specifically, to enhance their practices in SP [10].

1.1 GenAI roles in SP according to previous literature

GenAI has produced considerable reactions in academic publishing communities, with some investigating the potential of GenAI in order to support scholarly publishing or its potential impact on academic integrity [11]. GenAI can support scholarly publishing through its ability to analyze texts and data [12]. It also has an obvious role in contributing to the simplification of scientific writing [13], improving the quality of pattern recognition and supporting advanced data analysis [14], stimulating research practices [15], helping to obtain scholarly references [16], and performing linguistic correction [17]. Not only that, but GenAI can also be used to perform editorial tasks to mimic human editors in scientific journals. Despite the similarity in accuracy between the GenAI Editor and the human editor, GenAI Editor models can speed up the editorial process in scientific journals with high-quality output [18]. GenAI models can contribute to peer review processes, granting more objective and effective reviews and lowering the routine burden on human reviewers. GenAI is also useful in checking plagiarism and the integrity of methodology and data. GenAI can also support access to publications by translating studies into a variety of languages, which increases the opportunities for rapid and mass access to SPs [19]. GenAI is already playing multiple roles in SP, from simple tasks such as proofreading to more complex tasks such as creative generation of ideas and texts and information search. Hence, research into how to employ GenAI in SP tasks should not miss these tasks, whether simple or complex [20].

1.2 Concerns about the use of GenAI in scientific publishing

Even though GenAI has considerably influenced the features and characteristics of academic writing and publishing, GenAI, like many tools, can be misused and thus generate unethical practices [21]. Ethical compliance and concerns about the use of GenAI in scholarly publishing are challenges facing the research community, and there is a great deal of harmony about these concerns and challenges [22, 23]. While GenAI facilitates tasks such as summarizing and analyzing literature, it poses ethical and practical challenges, most remarkably authorship issues, increased risk of plagiarism, and distortion of originality, the spread of misinformation, embedded biases in content and their impact on fairness and inclusiveness, as well as challenges of transparency and accountability in its use [10]. GenAI has generated some

strange practices that are uneven with the rules and ethics of scientific research, such as generating content that has no connection to reality or scientific references that do not exist or have been verified, which often leads to doubt about the results of scientific research [21]. Lack of transparency, bias, privacy, and other concerns are also concerns that should be overcome by developing policies related to how GenAI is used in SP [24]. GenAI is only as good as the data it is trained on, if the training data reflects existing biases, the outputs of the AI may extend and worsen these biases [19]. GenAI applications may also maintain all data they receive, including texts and documents, which means that scientific content created or modified using these applications may be accidentally used in successive responses. So, researchers, writers, and editors should exercise extreme caution when using GenAI, especially if they are working on secret or copyright-sensitive data [20].

1.3 GenAI policies for scientific publishing

Such ethical challenges stand in divergence to the support GenAI can provide to SP processes; therefore, many institutions have resorted to developing frameworks and policies for the use of GenAI in scientific research and publishing to avoid the negative effects of GenAI and enhance the great potential and capabilities that can result from the use of GenAI [25]. In this regard, the World Association of Medical Editors (WAME) established five principles governing the use of GenAI in SP, which are based on: (1) Only humans can serve as authors; (2) Authors must acknowledge the sources of citations to their references; (3) Authors must take full responsibility for the content of the work; (4) Editors and reviewers must identify any use of GenAI in writing or reviewing the publication; and (5) Editors and publishers must develop digital tools that are capable of detecting machine-generated content and ensuring the integrity of the SP process [20]. In connection with the current research context implemented in the Kingdom of Saudi Arabia, the Center for University Education Development (CUED) at King Abdulaziz University has moved towards developing a guide to policies for using GenAI in SP [26]. The guide included two main axes: The first axis is based on the ethics of scientific research and includes the necessity of not violating the originality of the research and scientific integrity through clear disclosure of research outputs, respecting intellectual property rights, and maintaining the privacy of the data used, in addition to the necessity of transparently disclosing the challenges and limitations faced by the researcher while using GenAI. The second axis involved the use of GenAI in generating topics and ideas, taking into account their relevance to the specialization, and that the formulation of objectives and hypotheses be realistic and unbiased, verifying the accuracy of the generated data, ensuring transparency in statistical processing, confirming the data analysis process with an independent review and not relying on GenAI analysis alone, taking into account avoiding plagiarism violations, and ensuring the original contribution of the research even when using GenAI. And peer review of research to protect intellectual property rights. The research team believes all the above.

It should be noted that ethical frameworks, such as the policies of the WAME and the CUED, are not considered comprehensive global standards. Rather, they are key influential examples within specific academic contexts. These policies were used in this study as reference frameworks to study how to frame the uses of GenAI in SP, with the goal of building a solid conceptual foundation that can be expanded and adapted to suit broader global contexts in the future. This approach ensures that the

study is based on established principles while simultaneously acknowledging the evolving nature of ethical practices associated with the use of GenAI globally.

1.4 Statement of problem and rationale

According to what is mentioned above, to achieve sound practices regarding the use of GenAI in SP, there must be specific and clear rules starting from the draft to the final publication [19]. These rules may be derived from sound experiences led by expert researchers who have used GenAI properly in their SPs according to sound frameworks linked to clear policies, which is what this study is trying to do, so that the correct and sound foundations for using GenAI in SP are selected and reviewed according to what is approved by the literature [10, 19, 22, 23], as well as according to WAME policies [20], in addition to the CUED Guide and Policies for the Use of GenAI in SP, which represents a major context for the current research [26]. Therefore, this study is based on many gaps, including the knowledge gap associated with the novelty of GenAI and the lack of clarity of all its capabilities and characteristics when used functionally, which means the need to make more studies that define the frameworks for its use in various fields, including the field of SP. This is in harmony with the literature that has shown that employing GenAI in scientific research is one of the research trends that should be addressed in future studies to identify the capabilities of this digital tool and explore the opportunities it offers in supporting scientific research, especially since GenAI can help in research creativity and innovation [27]. Also, this is consistent with the fact that GenAI, as a modern digital tool, may face challenges for researchers in employing it correctly, especially regarding aspects of privacy and ethical use [28]. Accordingly, the intellectual gap and the existence of conflicting trends regarding the advantages of GenAI in SP, as well as the fears and threats resulting from its use, can be considered one of the basic motivations that require conducting studies that analyze the uses of GenAI according to an ethical context that determines what is permissible and what is not. In a related context, the research team noticed a noticeable scarcity in previous literature that addressed the use of GenAI as an integrated process in SP, starting from preparing the study, then submitting it for publication, processing it by the publishing entity, and finally after publishing the study and promoting it (publication and dissemination), which prompted the research team to attempt to frame the uses of GenAI in the three axes of SP. In addition, according to the methodological context, this study comes to fill a methodological gap, as it can be said that discussing issues related to employing SP with the support of GenAI has not received its fair share of study using the qualitative approach in general and the phenomenological approach, as such issues require in-depth analyses and insights with those concerned and within the context of frameworks and policies regulating the use of GenAI in SP processes, which is what the current study attempts to implement by exploring and analyzing the journeys of researchers who used GenAI in SP processes.

1.5 Research questions and objective

This study aims to identify the actual practices linked with the use of GenAI in SP, whether during the preparation of the research study or during its submission and processing at the publishing entity, and finally in the publication and dissemination stage. This is with the condition that these practices are in harmony with the ethical

policies and uses associated with the use of GenAI in scientific research. This comes through analyzing and exploring some of the journeys of distinguished researchers who have experience in using GenAI tools in scientific research to reach deep and integrated insights into the use of GenAI in SP. Therefore, this study tries to answer the following main question:

How do researchers describe the uses of GenAI that are consistent with ethical policies in supporting SP?

The following sub-questions branch out from the previous question:

- How do researchers describe the capabilities of GenAI in the preparation stage of the research paper?
- How do researchers describe the capabilities of GenAI in the submission and processing stage of the research paper?
- How do researchers describe the capabilities of GenAI in the publication and dissemination stage of the research paper?

The answers to the above-mentioned questions can contribute to supporting all researchers regarding ethically disciplined practices that can support and facilitate scientific research processes and procedures based on GenAI tools. Besides, by answering the previous questions, the study can be considered a guide for publishing entities regarding the use of GenAI in supporting the publishing system and developing it according to the latest smart technologies. The answers to these questions can also be relied upon to develop new guides and policies for the use of GenAI in scientific research.

Based on the objectives of this study, the rest of this paper is organized as follows: Section 2 presents the conceptual framework of GenAI. Section 3 includes study methods. Section 4 presents the main results regarding the potential of using GenAI in PS. In Section 5, we will discuss the results. Section 6 is dedicated to the study's implications, Section 7 for limitation, and section 8 for conclusion.

2 CONCEPTUAL FRAMEWORK

GenAI indicates algorithms that can be used to create new content such as texts, images, videos, and audio [29–31]. GenAI is a form of intelligence that can autonomously generate new content, providing innovative methods for content production, improving the search experience, and reshaping the ways information is generated and presented so that it becomes new entry points for online traffic [32]. GenAI aims to enhance research, data mining, analysis, and comparison processes [33], as well as affect the accuracy of predictions and data-driven decision-making processes [34]. GenAI can thus contribute to hastening research processes and increasing their efficiency and accuracy [35]. It helps researchers improve research report writing, correct linguistic errors, and obtain personalized recommendations [36]. GenAI has also been able to enhance the efficiency and quality of SPs through its ability to analyze and classify data and improve the literature review process [37]. Meanwhile, GenAI has helped save researchers time and effort by producing large amounts of correct and coherent analyses and texts [38]. In addition, researchers can promote their research through GenAI [39]. As for GenAI models that can be used to support SP, Table 1 shows some of the GenAI models specialized in supporting scientific research processes that can be used effectively within the SP system.

Table 1. GenAI applications used in SP

NO.	GenAI Model	Website Link	Core Function	Research Usage Context
1	Explain paper	https://www.explainpaper.com/	Analyzing and explaining research papers	Analyze abbreviations, analyze research papers, and generate similar research papers [40].
2	Connected papers	https://www.connectedpapers.com/	Discovering relationships between studies	Access related research papers, find relationships between previous studies, discover original and subsidiary studies [41].
3	Paperpal	https://paperpal.com/	Editing and proofreading	It is used in editing, proofreading, and generating appropriate references [42].
4	Scisummary	https://scisummary.com/	Summarizing and analyzing research papers	Accurate and fast analysis of research papers, analysis of all figures and graphs in the research paper, analysis of numbers, and access to specific information in the paper [43].
5	Consensus	https://consensus.app/	Comparing and summarizing research	Provides clear summaries and comparisons between research papers. Provides scientific information based on evidence and references [44].
6	Perplexity	https://www.perplexity.ai/	Generating accurate answers from reliable sources	Generating practical answers based on reliable sources, translating, writing texts, providing concise and accurate summaries, and presenting multiple perspectives on scientific content [45].
7	Researchrabbit	https://www.researchrabbit.ai/	Organizing research and discovering authors	Recommend related research papers, discover authors, organize related research into relationships between roots and branches, and analyze citations to show their impact [46].
8	Elicit	https://elicit.com/	Analyzing and critiquing research	Asking open questions, customizing research results, summarizing research papers, critically analyzing research papers, and creating matrices for research papers, extracting key information from the research paper [47].
9	Scite	https://scite.ai/	Analyzing citations	Asking open questions, customizing research results, summarizing research papers, critically analyzing research papers, creating matrices for research papers, and extracting key information from the research paper [48].
10	Scholarcy	https://www.scholarcy.com/	Summarizing and managing research	Summarize research papers, compare research, extract key information from research, create personal libraries of research papers, and create flashcards of research papers [49].
11	Writefull	https://www.writefull.com/	Improving academic writing quality	Proofreading, rephrasing, academic terminology search, and language style improvement [50].
12	Dimensions AI	https://www.dimensions.ai/	Analyzing research and institutional performance	Provide brief summaries, analyze citations, discover knowledge gaps, provide detailed indicators of the research performance of researchers and institutions, and find other researchers in the same field of interest [51].

Note: *The validity of all links listed in Table 1 has been reviewed and confirmed to be effective until 8/2/2025.

In the context of the theories that can be trusted regarding the role of GenAI in enhancing the SP movement, the social construction of technology theory emphasizes the influence of human involvements and discourses on GenAI technology, as the concept of the social construction of technology refers to a research approach and theory that explores the relationship between society and technology, with a focus on the impact of social factors on the development and use of technology [52]. This implies technological development is the result of human efforts and conversations and not the result of the self-development of technology, which means that human and social factors play the greatest role in the development of GenAI technology [53].

Our research team believes that this theoretical context means that the increase of the use of GenAI to serve SP increases and grows with the growth of the treatments, inquiries, and content that researchers themselves add, and that it is important and necessary to consider the interaction between researchers and GenAI tools as an integrated and interconnected process through which human efforts and modern technologies interact to develop research products in a way that ensures the acceleration of their implementation and the quality of their outputs. This interactive process that takes place between researchers and GenAI tools is a process driven by researchers themselves, and GenAI tools do not develop or advance except with the input of researchers, as GenAI tools' language models are trained and improved only with the frequency of training on data entered by researchers, which may somewhat dispel concerns that the role of the researcher is disappearing in the context of the growth of GenAI tools.

Moreover, the Theory of Planned Behaviors provides a useful lens through which to investigate the dynamics behind researchers' behavior associated with the use of GenAI tools in SP processes. The Theory of Planned Behaviors suggests that behavior is shaped by three axes centered around attitudes, subjective norms, and perceived behavioral control, which collectively influence the formation of behavioral intentions and subsequent actions associated with the use of GenAI tools [54]. This drives users towards self-regulation in their technology use, in line with the standards they have set and the expectations they want to meet [55]. Thus, the research team believes that the positive perception of the value of GenAI tools generated by some researchers' experience using these tools in research situations that resulted in quality research outputs may contribute meaningfully to improving behavioral intentions to expand the use of GenAI tools within a broader scope of SP across all three stages of preparing a research manuscript: the preparation stage, the submission and processing stage, and the publication and dissemination stage, accompanied by the transformation of these intentions into behavioral actions within the research community, such that these actions involve normative behavioral practices that encourage the ideal use of GenAI tools in SP processes.

According to the constructivism theory, a new vision of GenAI's potential to support and develop the SP movement can be indicated. The constructivist theory is based on the philosophy that knowledge is an active process in which people construct their understanding of the world based on their experiences and interactions with the environment. People are not just recipients of knowledge, but they actively construct their own understanding through interactions and experiences, as well as interpreting knowledge based on their beliefs and prior knowledge [56]. Regarding this theory, the researcher does not just receive knowledge but actively constructs it through interaction with GenAI tools and the information generated by them. Accordingly, the researcher's use of GenAI tools is not just information consumption but an active knowledge construction process. This can be explained by an example: a researcher with expertise in a particular field. Using GenAI, this researcher can generate accurate keywords, find relevant research, classify, analyze, and comment on it.

In fact, this process is not limited to collecting information but rather enables the researcher to build new ideas and deeper insights. That is to say, GenAI is not only used to provide the researcher with ready-made information but also provides him/her with tools that help him/her build his/her own knowledge and expand his/her research horizons. This is in line with the basic idea of constructivism, which sees that knowledge is built, not acquired. The context in which GenAI tools are used should be to back the researcher, not to replace him/her and perform his/her tasks.

This principle is consistent with the fact that digital technologies are one of the basic tools that can be trusted in building knowledge more than communicating with knowledge [57–61]. Making technology merely tools used to communicate with knowledge makes them less valuable and pushes them towards less useful and effective use [55, 62, 63]. This must be accompanied by the context in which GenAI tools are used, being a context for supporting the researcher and not replacing him/her or performing his tasks. This context must also be framed by many policies, practices, and studies that define the ethical and responsible use of GenAI in scientific research, as this study does.

3 METHODOLOGY

3.1 Approach

Regarding the study problem and questions, this study used the phenomenology approach, which by its nature aims to understand the meaning of the phenomenon through the events and experiences of individuals and allows researchers to understand how individuals construct the reality in which they live [64]. This approach can provide in-depth insights into the experiences of individuals and participants [65]. Moreover, it helps in discovering and studying experiences [66]. This makes it suitable for this study, which aims to collect in-depth data through interviews and then analyze and organize it through specific interpretive methods [67]. In order to answer the research questions, a semi-structured interview tool was built to investigate researchers' experiences and journeys in using GenAI tools in SP. Data was collected by interacting with participants via Zoom and engaging in in-depth discussions.

3.2 Participants

The final number of participants in this study was (8) researchers, as saturation in the responses of participants in the qualitative study can be achieved through (6) interviews that help in reaching a complete description of the aspects of the concepts included in the research [68]. Participants were selected from King Abdulaziz University so that the ethical aspects related to the use of GenAI in scientific research can be controlled according to the policy guide developed by the university by the CUED [26], in addition to the controls set by WAME for the use of GenAI in scientific research [20]. The study used the snowball sampling method to select study participants so that they are distinguished in SP and the use of GenAI tools. It was agreed that participants must be distinguished in SP as an indicator of researchers' interest in the quality of their research and their eagerness not to violate the ethics of SP, whether by using GenAI or otherwise. The snowball sampling method was used to examine each case of each participant selected, as initial conditions were set for selecting participants, as follows:

- The researcher influence factor is not less than (H.index 20) to ensure that he/she has multiple publishing experience.
- The researcher has at least (3–5) research papers published in (Q1) journals within Web of Science as an indicator for publishing in journals that adopt high standards of accuracy in publishing.

- The researcher uses GenAI applications with a minimum of two applications, one of which is a general application and the other specializes in scientific research, to ensure diversity and richness in the experiences of using GenAI.
- The researcher has a full subscription/paid subscription through one of the GenAI applications to ensure benefit from all the services and capabilities of the application.
- The researcher uses GenAI applications in at least (3) pieces of research to ensure repetition of the practice and the stability of its concept for the researcher.
- The researcher attends at least one course using GenAI.
- The researcher agrees to present and discuss practical models for using GenAI in implementing his own research.
- The researcher acknowledges his use of GenAI applications in accordance with ethical controls and policies.

Based on the previous conditions, the eight researchers were selected consecutively through successive nominations from the participants using the snowball method. The researchers were coded with the symbol (R) and given numbers from (1–8), so that the first participant was (R1) and the last participant was (R8). Table 2 shows the information of the participants in the study.

Table 2. Data of the researchers participating in the qualitative study

NO.	H.Index	Papers in Q1	Using GenAI	GenAI-Based Papers	Courses in GenAI
R1	21	4	Gemini AI, Scisummary, Researchrabbit	5	2
R2	20	3	Chat-GPT, Writefull, Scite	6	1
R3	23	5	Chat-GPT, Scopus AI, Consensus	5	2
R4	21	5	Chat-GPT, Paperpal, Scholarcy	6	1
R5	22	5	Gemini AI, Explainpaper, Elicit	4	2
R6	24	5	Chat-GPT, Paperpal, Dimensions AI	7	3
R7	31	8	Gemini AI, Explainpaper, Paperpal	5	2
R8	32	7	Gemini AI, Writefull, Connected Papers	5	3

3.3 Data collection tool

The semi-structured interview tool was used to collect data from the participants. The semi-structured interview tool is one of the important tools that contribute to obtaining detailed and in-depth information about the study problem and helps in focusing on a comprehensive and deep understanding of its aspects [69]. In addition, semi-structured interviews provide the ability to interact with participants well, which helps in extracting information and data accurately [70]. Some opening questions were developed to start the discussion with the selected researchers, who were selected according to the previous step. Examples of questions/requests that were addressed to the participants:

- Describe your experience using GenAI to support the research papers you write?
- Describe your experience using GenAI to communicate with resources and SP destinations?

- Describe your experience using GenAI to promote the research papers you publish?
- Tell us about the unique uses of one of the GenAI applications in scientific research?
- Describe how you use GenAI according to ethical controls and policies?
- Tell us how the use of GenAI can enhance SP?
- Describe the implications of using GenAI on your research performance?
- Present your vision for supporting researchers in using GenAI in scientific research?
- Explain how you see the future of SP considering the development of GenAI applications?
- Describe the most important uses of GenAI that you cannot avoid when conducting your scientific research currently.

These questions represent primary questions combined with other sub-questions according to the course of the discussion with each of the eight participants in the semi-structured interviews that were implemented over the course of (8) days, with one meeting per day with one participant.

3.4 Procedures

These current study participants were contacted one by one, where all the conditions for each participant were verified, and the nominated participants were also verified by the main participant. An appointment was set for each participant who met the conditions. The semi-structured interviews were set so that one interview was conducted per day. The interview dates were set according to the time available to the participants, where (3) interviews were conducted in the morning from 9–11 am, two interviews in the afternoon from 2 pm to 4 pm, and three more interviews in the evening after 8 pm. The interviews were organized via the Zoom Platform so that the interviews could be conducted flexibly with the participants and to see some of their practical experiences in using GenAI tools, and so that the interviews could be recorded after obtaining their consent. The duration of the interviews ranged from (45) minutes to (90) minutes. The interviews were conducted in Arabic. All interviews were recorded and transcribed into text versions and then shown back to the experiment participants to ensure their accuracy.

3.5 Data analysis

Participants' responses were carefully analyzed, first copied literally. Then, the coding process was applied to the texts to group them under specific subtopics. These subtopics were then classified into the main axes of GenAI's potential in supporting practical publishing. The MAXQDA program, which specializes in qualitative data analysis, was used to conduct all these processes, starting from initial data coding to creating a conceptual map of the topics. The analysis process resulted in reaching multiple potentials of GenAI in scientific research, in three main axes that included eight sub-axes. Figure 1 below shows a conceptual map of topics that illustrate the potential of using GenAI in scientific publishing.

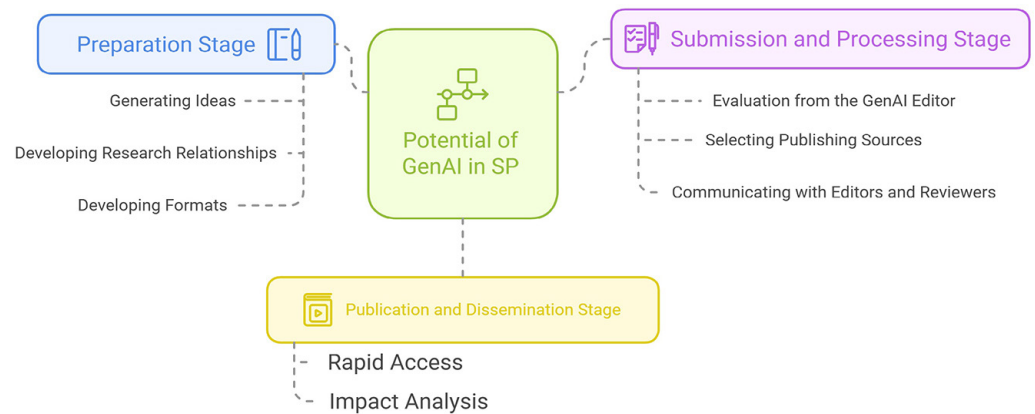


Fig. 1. Potential of GenAI in SP

As shown in Figure 1, the first axis is the preparation stage and includes three sub-axes including 1) Generating Ideas, 2) Developing Research Relationships, and 3) Developing formats. The second axis is the Submission and processing stage and includes three sub-axes, including 1) Evaluation from the GenAI Editor, 2) Selecting Publishing Sources, and 3) Communicating with Editors and Reviewers. The third axis is the Publication and Dissemination stage, which includes two sub-axes: 1) Rapid Access and 2) Impact Analysis. Figure 1 below shows a conceptual map of topics that illustrates the potential of using GenAI in scientific publishing.

4 RESULTS

The research results will be presented in three sub-sections, the first section for the potential of using GenAI in the SP preparation stage, the second section for the potential of using GenAI in the processing and submission stage, and the third section for the potential of using GenAI in the publication and dissemination stage. They will be presented as follows:

4.1 The potential of GenAI in the preparation stage

This section covers three subtopics, including 1) Generating Ideas, Developing Research Relationships, and Developing formats. They will be presented as follows:

The potential of GenAI in Generating Ideas. GenAI's most significant potential in the SP preparation phase is its ability to support researchers in generating ideas. By analyzing the interview results, it was concluded that GenAI is not just a technical tool but a catalyst for creativity in SP. GenAI inspires researchers and helps them see ideas from a different perspective and encourages thinking in unconventional ways. This was visible in one of the participants' responses, where he stated:

"I think GenAI is a creative partner for us as researchers, as it can generate alternative or complementary ideas to my research ideas, and this helps expand the scope of the research we conduct and explore new angles. It provides a different perspective, and I often see that it helps to overcome the researcher's personal biases, and encourages thinking in unconventional ways, which contributes to the development of the scientific research system." (R3)

Interviews with researchers revealed that generating ideas through GenAI is a deep process that does not rely solely on asking GenAI a direct question. Generating creative ideas comes from GenAI's superior ability to process enormous amounts of data and extract new insights that help researchers identify knowledge gaps and suggest innovative research paths. To confirm this, one researcher stated the following:

“As a researcher, I see GenAI as a qualitative leap in the scientific research process through its ability to analyze very large amounts of data and extract hidden research patterns and relationships, which helps inspire researchers with new ideas for promising research projects. It is like a personal assistant for the researcher that helps identify knowledge gaps.” (R7)

During our interviews with participants, GenAI was repeatedly described as a “creative partner” for researchers. This description accurately reflects the role that GenAI plays in stimulating research creativity, helping to formulate hypotheses and research questions that lead to more innovative research outcomes. The interviews demonstrated how this collaboration between researchers and GenAI helps develop new research horizons. In this context, one researcher noted the following:

“I see GenAI as a creative partner whose role is not limited to routine responses but rather extends to include in-depth discussions and multiple analyses that help generate new hypotheses and research questions that enrich the scope of research in which the researcher works. It enables researchers to explore new angles of existing problems, and propose innovative solutions that were not previously proposed, based on multiple interactions with GenAI applications.” (R1)

The potential of GenAI in developing research relationships. These interviews showed that developing research relationships, whether between research topics, between researchers and other researchers, or between researchers and research institutions, became easier and more convenient with GenAI. GenAI can contribute significantly to building interactive maps of research relationships. These maps not only show the connections between researchers but also the connections between research topics and the connections between researchers, research topics, and research institutions. These connections help researchers to integrate more effectively into the development of the research infrastructure of their topics. They can also contribute to finding funding opportunities for research. In this context, one of the participants pointed out the following:

“There have been many GenAI applications that are specialized in scientific research, and these applications help in developing interactive matrices and maps that show the relationships between researchers, research institutions, and research topics. I see that these maps help researchers understand the structure of the research topic that I am working on, identify potential points of contact, and build new research relationships that help me develop the field of research that I am working on (...). I have relied on some of these maps to identify research gaps, write previous literature, and areas that need more research. I see that these maps may have greater dimensions in improving SP, as they can encourage researchers to build research partnerships, and the possibility of identifying funding opportunities available to finance the research that I am working on.” (R5)

One of the important things for preparing scientific research is understanding the development of the research field to build fruitful research relationships. Here, the role of GenAI emerges in tracking the path of research ideas and identifying their roots, which enables researchers to understand the historical context of their research and communicate with pioneers in their field. This helps build bridges of communication between different generations of researchers and exchange experiences and knowledge that ultimately positively reflect on the research product. In this context, one of the participants indicated the following:

“GenAI has become a key player in tracking the development of research ideas over time, and identifying the original research from which other research was launched. This helps us as researchers to understand the timeline of ideas, and identify researchers who have contributed considerably to the development of their field (...), which helps to communicate with them and build distinguished research relationships.” (R2)

Recently, it has become clear that GenAI can efficiently help identify influential researchers in a specific field. This can be done by analyzing publication and citation data, which assists GenAI in providing accurate recommendations for other researchers to connect with and to identify hot topics in a particular field. All of this undoubtedly facilitates the building of strong research relationships and the exchange of expertise and knowledge, which is positively reflected in the final research product. One participant stated to emphasize this as follows:

“I found a significant feature in one of the GenAI applications where the application analyzes citations and determines the extent to which particular research has influenced subsequent research, which helps me to evaluate the quality of research and identify influential researchers within the space of the research paper I am working on. That’s why I believe that one of the most important advantages of GenAI is identifying influential researchers in a particular field and providing recommendations for other researchers to connect with. I see this as helping us as researchers to build strong research relationships, and exchange knowledge and expertise among researchers. In addition, GenAI applications have become more capable of analyzing research trends and identifying hot topics in a particular field (...), which helps researchers direct their research towards topics of greater importance.” (R3)

The potential of GenAI in Developing formats. It is fundamental to improve the textual, numerical, and graphical formats of SPs to build a good scientific product. There is no doubt that the quality of textual formulation is a critical element in the acceptance and publication of research. GenAI applications can help researchers improve the quality of their scientific writing by checking the language and grammar, improving the fluency and clarity of the text, and ensuring the accurate use of scientific terminology. Also, there is no doubt that this benefits raising the level of published research and increases its impact in the research community and saves valuable time for researchers to focus on the scientific aspects of the research they are preparing. In this context, one researcher pointed out the following:

“I actually found what I was looking for in one of the GenAI applications, which helped me improve the textual formulations in my research in several ways. It can detect spelling and grammatical errors and correct them accurately,

improve the fluency of the text by rephrasing complex sentences, and suggest better alternatives for scientific words and phrases (...). It can also help me ensure that scientific terms are used correctly and correctly and avoid unnecessary repetition and wordiness. Moreover, it helps me summarize research and write abstracts in an attractive and clear way and improve the readability of research.” (R8)

Also in scientific research, presenting statistical data and numerical results clearly and accurately is of utmost importance. The results have shown that GenAI provides powerful tools to improve data presentation and interpretation in scientific research. It helps create tables that facilitate understanding of results and drawing conclusions and helps analyze complex data, presenting it clearly and concisely. Some GenAI applications can also be trusted in statistical analysis processes. This was supported by one of the participants, who stated the following:

“I have more than one experience in which I used one of the GenAI applications to improve the language of numbers by creating interactive tables and graphs that facilitate understanding of data and highlight neglected patterns and relationships. There are also applications that help in analyzing complex statistical data, extracting patterns and numerical relationships, and presenting them in a clear and attractive way in the research text. Besides, some applications helped me in creating automated reports that provide a comprehensive summary of the data (...), which helps well in writing the results section in research and studies in an accurate and concise manner. Generative artificial intelligence applications can also be trusted to verify the validity of data and correct errors in it, which improves the quality of analyses and conclusions that ultimately lead to high-quality scientific research.” (R6)

There is no doubt that figures and graphs are an integral part of SP, as they help clarify complex concepts and present data in an attractive visual way. The results showed that GenAI can contribute to improving the quality of these visual elements in scientific research. It helps in creating professional figures and graphs that meet SP standards and helps in communicating information successfully. One of the participants confirmed this by saying:

“I have personally used more than one GenAI application to create figures and graphs that meet the standards of publishing in scientific journals. Some of these applications help in improving the quality of images used in research, removing noise, adjusting colors, and creating accurate illustrations of scientific concepts. Some applications also help me in developing diagrams that illustrate some of the relationships between the main and sub-topics within the field of research that I am doing, which improves the quality of the research overall.” (R5)

4.2 The potential of GenAI in the submission and processing stage

This section includes three subtopics, including 1) Evaluation from the GenAI Editor, 2) Selecting Publishing Sources, and 3) Communicating with Editors and Reviewers.

The potential of GenAI in Evaluation as a GenAI Editor. The most significant characteristic of using GenAI during the submission and processing process for publishing research is the ability to rely on GenAI applications as gene editors to help researchers evaluate their research before final submission to journals, thus increasing the chances of the research being accepted. Using GenAI applications as gene editors to evaluate research before publication can provide a comprehensive and objective evaluation of the research, including multiple aspects such as the originality of the idea, research methodology, data analysis, and quality of formulation. This undoubtedly helps researchers improve the quality of their research and increase the chances of its acceptance in prestigious scientific journals. Here, one of the participants confirmed this by saying:

“It has become a habit for me to rely on smart applications such as GenAI Editor to evaluate my research before submitting it for publication to increase the chances of its acceptance. These applications help in evaluating the originality of the research idea by comparing it to previously published research, evaluating the research methodology used and its suitability for the research objectives, analyzing the data used and its accuracy and reliability. Also evaluating the quality of linguistic and grammatical formulation, clarity of ideas, and logical sequence of presentation (...). In addition, I used one of the modern applications to analyze my research according to the standards of publication in one of the journals to ensure that the research is consistent with the standards of publication in the targeted journal, which facilitates the publication process and increases the chances of acceptance.” (R1)

In a similar context, the results showed that the most important feature of the gene editor is its ability to suggest specific and effective improvements to research. These suggestions and improvements are not limited to linguistic aspects, but also include methodological, analytical and objective aspects. This helps researchers make the necessary modifications to their research before submitting it for publication, which increases the chances of acceptance and improves its quality in general.

“I have a direct way of using smart applications as gene editors, which is to ask specific questions to get suggestions for improving research in all its aspects. For example, I would ask the application to suggest modifications to the methodology used to increase its accuracy and effectiveness, or to suggest additional data analyses to strengthen the results and conclusions. I also used gene editors to suggest rephrasing some sentences or paragraphs to make the text clearer and smoother, or to suggest adding additional references or sources to support the ideas presented.” (R4)

The potential of GenAI in Selecting Publishing Sources. One common challenge for most researchers is choosing the right journal to publish their research. This takes a lot of time and effort to search for journals that fit the scope and objectives of the research. The results showed that GenAI provides effective solutions to this problem by analyzing the content of the research and matching it with the scopes of different journals, which helps researchers make informed publishing decisions. One participant presented his experience in this and stated the following:

“In my last experiment, I used a tool based on GenAI to nominate journals suitable for my research. I uploaded the research abstract and keywords, and the

tool analyzed and matched them with the scopes of hundreds of scientific journals. I was surprised by the high accuracy of the results, as the tool nominated journals that I did not know before but were completely suitable for my research topic. This saved me a lot of time and effort in manually searching for journals and helped me choose the best journal to publish my research. I tried this tool on previous research and noticed a significant improvement in the speed of finding the right journal.” (R6)

It is certainly important and necessary to understand the publishing criteria in different scientific journals, such as impact factors, publication policies, and target audience. Here, GenAI can help analyze these criteria and provide researchers with comprehensive information about the appropriate journals to publish their research. This helps researchers increase the chances of their research being accepted in prestigious journals. Here, one researcher presented her experience, stating the following:

“I was facing difficulty understanding the publishing criteria in different scientific journals, especially with the presence of many complex criteria such as impact factors, number of citations, and open access policies. I decided to try one of the GenAI applications to analyze these criteria and provide simplified information about them. The application (...) analyzed the data of different journals and provided a comprehensive report showing the publishing criteria in each journal, the target audience, and the acceptance rate of research. This helped me understand the differences between journals and make an appropriate decision about which journal to submit my research to. GenAI applications made a lot of effort easier for me.” (R1)

Also, GenAI applications can help predict the possibilities of research being accepted in scientific journals. This can happen by analyzing data from previously published research in the journal, where GenAI applications provide researchers with an initial assessment of the chances of their research being accepted, helping them make informed decisions about choosing the right journal. Here, another researcher presented her experience, saying:

“After finishing writing my research, I decided to try using GenAI to predict the chances of it being accepted in scientific journals. I uploaded the research abstract and keywords, and the tool analyzed and compared them with previously published research in different journals (...) The tool provided me with an initial assessment of the chances of my research being accepted in each journal, explaining the factors that influenced this assessment. This helped me choose the journal that had the highest chance of my research being accepted and avoided wasting time sending the research to journals with low chances of acceptance. It was a very useful experience.” (R8)

The potential of GenAI in Communicating with Editors and Reviewers.

Usually, researchers' communication with editors and reviewers during the manuscript submission process includes many processes, including writing a cover letter, responding to reviewers' and editors' edits, and responding to these edits, among other types of communication. GenAI can play an active role in all the above. For example, writing a convincing cover letter can be a major challenge for many

researchers when submitting their research for publication. The letter should summarize the importance and novelty of the research in a concise and linguistically attractive manner, highlight its contribution to the scientific field, and its relevance to the scientific journal. Here, GenAI can help researchers write professional cover letters that increase the chances of their research being accepted. This is what one researcher who found this technology to be a valuable tool for effectively marketing their research expressed:

“I remember having a hard time writing a cover letter for my final research. I would spend hours trying to formulate attractive sentences that emphasized the significance of the research. But after using GenAI, everything changed. GenAI gave me several options for framing the letter, focusing on the main points of the research clearly and concisely (...) It really helped me present my research professionally, and I felt more confident about my chances of getting it accepted. It was a really great experience, and I would recommend it to any researcher looking to improve the quality of their cover letters.” (R3)

Understanding reviewer and editor comments is a crucial step in the PS publishing process. These comments can sometimes be detailed and complex, making it difficult for researchers to fully understand them. The results showed that GenAI can help researchers better understand these comments by summarizing them and clarifying their main points. This helps researchers respond to reviewer comments effectively and improve the quality of their research. One researcher stated:

“When I received reviewer comments on one of my papers, I felt frustrated because I didn't fully understand some of the points. This prompted me to try using a GenAI app to analyze these comments. The app summarized the comments, clarified the main points in simple and clear language, and provided ideas for responding to these comments. This really helped me understand what the reviewers were asking for and how I could improve my research. It was a very useful experience, and I would recommend these apps to any researcher who is having difficulty understanding reviewer comments.” (R7)

Responding to reviewers' and editors' comments is an essential part of the SP process. Responses should be organized and convincing and should clearly show how the researcher addressed the reviewers' comments. The results showed that GenAI can help researchers formulate professional responses that satisfy reviewers and increase the chances of their research being accepted. One researcher stated:

“After understanding the reviewers' comments (...) with the help of GenAI, I faced a challenge in organizing my responses clearly. I tried a smart tool that helps transform responses into specific points. I entered my initial responses, and the tool transformed them into neat and organized points, making sure that each point responded to a specific comment from the reviewer. This organization helped me to provide clear and convincing responses and was well received by reviewers. I recommend researchers to use these smart tools to better organize their responses.” (R3)

4.3 The potential of GenAI in publication and dissemination stage

This section includes two sub-axes, including 1) Rapid Access and 2) Impact Analysis, which will be presented as follows:

The potential of GenAI in Rapid Access. After publishing research, reaching a wide audience is a major challenge. An attractive abstract available in multiple languages helps attract the attention of other researchers and the public. GenAI can help generate attractive abstracts in multiple languages, increasing the chances of the research being read and viewed. This was confirmed by one researcher who stated the following:

“After publishing my research in a prestigious (...) journal, I wanted to ensure that it reached the largest possible audience of researchers around the world. I used GenAI to generate attractive abstracts in multiple languages, including English and Chinese. I noticed a significant increase in the number of downloads and views of the research after publishing these abstracts. This really helped me disseminate my research widely and connect with researchers from different linguistic backgrounds. It was a very fruitful experience, and I would recommend it to any researcher looking to increase the reach of their research.” (R8)

Social media is also an effective platform for publishing scientific research and communicating with the public. The results showed that GenAI can help to create attractive promotional content suitable for different social media platforms, such as short summaries, images, or videos explaining the research. This helps attract the attention of the public and raise awareness of the importance of research. One participant stated to emphasize the following:

“I wanted to share the results of my research on (...) with the general public, not just the scientific community. I used a tool based on GenAI to create promotional content suitable for social media platforms. The tool created short and attractive summaries, images and videos explaining the research, which I posted on my Twitter, Instagram and Facebook accounts. In fact, I noticed great interaction from the public with these posts, and my research message reached a wide segment of people.” (R1)

Also, scientific research can be transformed into educational materials suitable for different levels, such as educational articles or presentations. The results showed that GenAI can help create these educational materials easily and efficiently, which contributes to the dissemination of scientific knowledge on a wider scale. This is what one of the participants stated in presenting his experience as follows:

“I experimented with sharing my research outputs with my university students, so I used GenAI to transform my research into suitable educational materials. Indeed, through the tool, I created simplified educational articles, attractive presentations, and short tests to measure the extent of understanding the content. I used these materials in workshops and courses, and I noticed great interaction from the participants. Indeed, GenAI helped me spread scientific knowledge in an innovative and effective way.” (R2)

The potential of GenAI in Impact Analysis. The results showed that GenAI can be used to analyze the impact of published research not only according to the number of citations, but also GenAI can provide more advanced analytical methods that go beyond the mere quantitative count of citations and focus on analyzing the context of citations and their actual impact on subsequent research. This helps in a deeper understanding of the impact of scientific research and its influence on the development of knowledge in a particular field. This is what one participant mentioned when he pointed out the following:

“I was studying the impact of one of my research projects on the use of artificial intelligence in education. Previously, I relied only on the number of citations. But I tried using one of the GenAI tools, which really amazed me. It did not only show me the number of citations but also analyzed the sentences in which my research was cited, and revealed how other researchers used my ideas in their research. I discovered that my research had a significant impact on the field of applying artificial intelligence in education, which I would not have known by simply looking at the number of citations. It was a great experience that opened new horizons for me to understand the impact of my research and talk about its impact in the field afterwards.” (R7)

Social networks, both scientific and social, can provide valuable insights into the impact of published research, but manually analyzing this data is demanding. The results showed that GenAI can help analyze these networks automatically, uncover relationships between researchers and research ideas, and understand how ideas spread and influence the scientific community. This greatly helps in understanding the dynamics of research and its impact on the ground.

“I wanted to understand how the ideas of one of my research projects spread and I found a smart tool that analyzes social networks. I was amazed when the tool revealed to me a wide network of researchers who discussed my research on different platforms and revealed the subtopics that emerged from my research. This analysis helped me understand the true impact of my research, and how the research contributed to enriching the discussion on scientific issues.” (R1)

Similarly, the type of GenAI applications that show the relationships between research and researchers, although they can be used in the research preparation stage, can also be relied upon to analyze the impact of scientific research in the field. This can be done by identifying the research that branched off from the research, as well as the researchers who built their research on the same research, and other indicators. In this context, one of the participants stated the following:

“I used one of the GenAI applications to identify how one of my research projects on Covid-19 in 2020 became one of the basic research projects from which various research branched off over the past four years. Also, the application showed me how other researchers built their research based on my research as a main and influential reference in their research, and I believe that all of this can be relied upon as indicators of the impact of the researcher’s research in the field.” (R5)

5 DISCUSSION

In this section, the results will be discussed in three axes: the first axis is the potential of using GenAI in the SP preparation stage, the second axis is using GenAI in the processing and submission stage, and the third axis is using GenAI in the publishing and dissemination stage. They will be presented as follows:

5.1 The potential of GenAI in preparation stage

The research results showed that GenAI can radically transform the SP preparation stage, offering vital capabilities in three main areas: generating ideas, developing research relationships, and improving formulations. In terms of generating ideas, GenAI is not just a technical tool but a catalyst for creativity that inspires researchers, helps them see ideas from a different perspective, and encourages thinking in unconventional ways. GenAI becomes a creative partner that enables researchers to explore new angles of existing problems and propose innovative solutions that have not been proposed before. This is consistent with GenAI's ability to stimulate scientific research practices by providing new tools for generating ideas and proposing innovative research hypotheses, which encourages thinking outside the box and exploring new research areas [15].

In the area of Developing Research Relationships, GenAI facilitates the construction of interactive maps that show the connections between researchers, institutions, and research topics, helping researchers understand the complex structure of the research community, identify potential points of contact, and build new research relationships. It also helps track the evolution of research ideas over time and identify influential researchers in a particular field. This enhances GenAI's ability to facilitate the process of obtaining scientific references relevant to the topic, saving researchers a lot of time and effort in manually searching for references [16].

Finally, GenAI helps improve the quality of formulation (formats), whether textual, digital, or graphic, which contributes to raising the quality of published research and increasing its impact in the scientific community. This is complemented by GenAI's ability to simplify the scientific writing process and make it clearer and smoother, which helps researchers communicate their ideas effectively to the scientific audience [13], and to perform linguistic, grammatical, and spelling correction of scientific texts with high accuracy, which helps researchers improve the quality of their writing and ensure that it is free of linguistic errors [17]. This is consistent with GenAI's ability to analyze texts and big data quickly and efficiently, helping researchers extract hidden patterns and relationships that may be difficult to detect using traditional methods [12], and providing advanced capabilities in improving the quality of pattern recognition in data and supporting complex statistical and graphical analysis processes, helping researchers understand their data more deeply and draw accurate and reliable conclusions [14].

5.2 The potential of GenAI in submission and processing stage

GenAI proposes useful abilities in the research processing and submission phase, assisting researchers in three key interrelated aspects: evaluation as a gene editor, selection of publication sources, and communication with editors and reviewers.

GenAI can be used as a gene editor to evaluate research before final submission to journals, helping to improve the quality of research and increase the chances of its acceptance. According to the perceptions of the participants in this study, GenAI provides a comprehensive and objective evaluation of research, covering multiple aspects such as originality of the idea, research methodology, data analysis, and quality of formulation, and can suggest specific and effective improvements to research, including linguistic, methodological, analytical, and objective aspects. This evaluation role of GenAI mimics the work of human editors in scientific journals, as studies indicate that GenAI Editor models can speed up the editing process while maintaining the quality of the output [18], although there is ongoing debate about the extent to which their accuracy matches that of a human editor. In addition, GenAI helps in choosing the appropriate source for publishing research by analyzing the research content and matching it with the scopes of different journals, providing comprehensive information about the publication criteria in different scientific journals, and also contributing to predicting the chances of research being accepted in scientific journals, which helps researchers direct their research towards the most appropriate outlets. This ability to analyze data and information enhances the role of GenAI in peer review processes, as it can provide more objective and efficient reviews, reduce the routine burden on human reviewers, and is a valuable tool in checking scientific plagiarism and ensuring the integrity of the methodology used in research and the quality of the data used [19].

Finally, GenAI helps to improve communication with editors and reviewers by writing persuasive cover letters, understanding reviewers' comments, and crafting professional responses, which facilitates communication and contributes to improving the quality of the publishing process in general. GenAI performs multiple and diverse roles in the field of SP, ranging from simple tasks such as proofreading, grammar, and spelling to more complex tasks such as creative generation of ideas, texts, and scientific content, and searching for relevant information. Consequently, any research on how GenAI can be employed in SP tasks should consider these tasks at various levels, whether simple or complex, to provide a comprehensive picture of the role of GenAI in this field [20].

5.3 The potential of GenAI in publication and dissemination stage

GenAI can be used at the dissemination and publication stage to achieve key objectives: rapid access and impact analysis. In terms of rapid access, GenAI can help create engaging abstracts in multiple languages, increasing the chances of the research being read and viewed by a wider audience. It can also create engaging and appropriate promotional content for various social media platforms and transform scientific research into educational materials suitable for different levels. This is consistent with GenAI's ability to contribute to supporting access to SPs by providing accurate and rapid translation of studies into many languages, which greatly enhances the chances of rapid and massive access to these publications by researchers and readers from different linguistic backgrounds around the world, thus helping to disseminate scientific knowledge more widely [19]. In addition, researchers can use GenAI as a powerful and effective tool to promote and increase the dissemination of their research in scientific circles and beyond [39]. Furthermore, GenAI can generate engaging and concise summaries of research in multiple languages and create promotional content suitable for various social media platforms, such as simplified graphs or visual summaries (Infographics), which helps attract audience attention and increase awareness of the importance and influence of research.

In the field of impact analysis, GenAI offers advanced analytical methods to understand the impact of research after publication, going beyond just counting citations and focusing on analyzing the context of citations, analyzing scientific social networks, and predicting future impact. This helps in a deeper understanding of the impact of scientific research and its impact on the development of knowledge in a specific field. GenAI can positively impact increasing the accuracy of predictions in various scientific fields, thus improving the quality of decision-making processes based on the analysis of available data [34]. For instance, GenAI can analyze massive amounts of data and extract complex patterns and relationships between them, which helps in building more accurate predictive models in areas such as predicting the development of phenomena. These accurate predictions in turn contribute to making more effective decisions based on strong evidence. This is in line with the vital potential of deep learning techniques in data analysis, which contributes to accelerating scientific discoveries and the quality of the necessary decision-making [71].

6 IMPLICATIONS

Based on the research results that were reached, which showed the existence of a clear role and positive practices in all stages of SP, it is possible to point out many reflections that can positively affect the field of SP, and these reflections extend to three categories, which are: researchers, research institutions, and the field of SP.

Regarding GenAI's impact on researchers, GenAI can transform researchers' practices by supporting them in multiple aspects related to scientific research skills. GenAI can help generate creative ideas by analyzing massive amounts of data and extracting hidden patterns and relationships, becoming a "creative partner" that inspires researchers with new hypotheses and research questions, enriching scientific debate and stimulating out-of-the-box thinking. Also, GenAI facilitates the development of research relationships by building interactive maps of relationships between researchers, institutions, and research topics, which helps understand the structure of the research community, identify points of contact, and build new relationships, along with tracking the development of research ideas and identifying influencers in a specific field. GenAI also contributes to improving the quality of formulation through linguistic and grammatical review, improving the flexibility and clarity of the text, ensuring the accurate use of scientific terms, and creating professional tables and graphs. GenAI facilitates the publishing process for researchers by helping them write compelling cover letters, understand reviewer comments, formulate professional responses, and choose the appropriate journal, which increases the chances of accepting research and studies. Finally, GenAI offers advanced analytical methods to understand the impact of research after publication, going beyond just counting citations to focus on analyzing its context, social networks, and predicting the future impact of research and studies.

Concerning the impact of GenAI on research institutions, research institutions can greatly benefit from GenAI in enhancing their productivity and efficiency. Research institutions can use GenAI to develop strategies to increase the productivity of their researchers and improve the efficiency of research and publishing processes. GenAI also encourages research collaboration by building strong networks

between researchers from different institutions, which contributes to the exchange of knowledge. GenAI contributes to improving the quality of research outputs published by the institution's researchers, which enhances its reputation and status. Moreover, GenAI can be used to analyze research trends and predict the future impact of research, which helps institutions make informed decisions about directing research investments.

Regarding GenAI's impact on the field of SP as a whole, GenAI is developing the field of SP in general. It contributes to accelerating the pace of publication by automating some stages and creating instant interactions that enhance the creative construction of SPs. It also helps improve the quality of published research through linguistic and methodological review and improved data presentation. GenAI contributes to increasing the dissemination of knowledge by creating summaries in multiple languages and promotional content suitable for social media platforms, which increases its reach to a wider audience. GenAI can contribute to the development of new criteria for assessing the impact of research, going beyond counting citations to focus on qualitative aspects and societal impact. Finally, new roles are expected to emerge in the field of SP, such as GenAI Editor, GenAI Reviewer, GenAI Graphic Designer, GenAI Research Translator, GenAI Promotional Summary Generator, GenAI Research Impact Analyst, GenAI Research Trend Discoverer, GenAI Research Access Optimizer, GenAI Research Authenticity Checker, GenAI Journal Selection Assistant, and other roles that may evolve and emerge continuously as the pace of progress in GenAI technologies accelerates. Table 3 illustrates the future roles of GenAI in SP. Figure 2 also provides an illustration of the future roles of GenAI in scientific publishing.

Table 3. Future roles in SP according to GenAI

NO	Job/Role	Description
1	GenAI Editor	Acts as an assistant to journal editors by providing initial assessments of manuscripts, suggesting potential reviewers from a database, and tracking peer review reports to ensure an efficient publication process.
2	GenAI Reviewer	Analyzes scientific manuscripts and provides a critical evaluation of their methodology, scientific contribution, and references to help editors and authors make informed decisions.
3	GenAI Graphic Designer	Creates complex graphs, charts, and illustrations from textual data, helping researchers visualize their results in a clear and engaging way.
4	GenAI Research Translator	Translates research papers and manuscripts from one language to another, while maintaining scientific accuracy and specialized terminology, to increase the global accessibility of research.
5	GenAI Promotional Summary Generator	Generates catchy and concise summaries of research, suitable for social media or other platforms, to raise awareness of the research and its impact.
6	GenAI Research Impact Analyst	Measures and analyzes the impact of research across various platforms, such as citations, online discussions, and media coverage, to provide detailed reports on the research's reach and influence.
7	GenAI Research Trend Discoverer	Analyzes large volumes of research data to identify emerging trends, knowledge gaps, and hot topics in different scientific fields.
8	GenAI Research Access Optimizer	Helps improve research accessibility by suggesting open access strategies, optimizing keywords, and ensuring the research aligns with publishing requirements.
9	GenAI Research Authenticity Checker	Verifies the originality of research and detects plagiarism or data manipulation by analyzing text, figures, and statistical data.
10	GenAI Journal Selection Assistant	Recommends suitable scientific journals for publication based on the research content, scope, and impact factors to increase the likelihood of the paper being accepted.

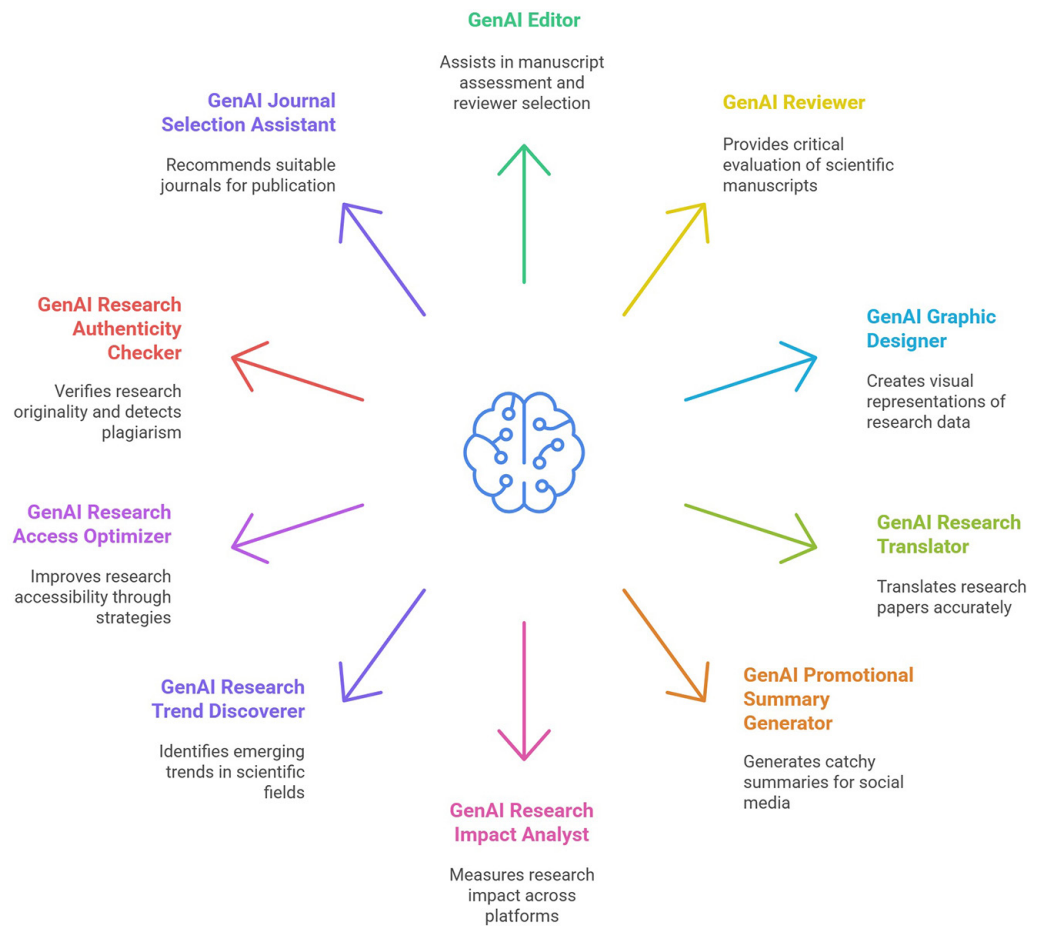


Fig. 2. Future roles in SP according to GenAI

7 LIMITATIONS

The scope of the current research is limited to publishing processes related to scientific research presented in specialized journals. Therefore, SP in other forms, such as conferences and forums, may reveal new roles and abilities for GenAI that were not addressed here. The research was also limited to studying the impact of GenAI on specific stages of the publishing process, namely: the preparation stage, the submission and processing stage, and the publication and dissemination stage. The research did not address later stages such as archiving, which opens the way for future studies that explore the roles of GenAI in this aspect.

Though the number of participants in the study (eight researchers) is limited, it is in line with the nature of qualitative research that focuses on gathering in-depth insights from a limited number of experienced individuals, and fullness of qualitative data can often be achieved after six interviews. However, future studies using a mixed methodology (quantitative and qualitative) are recommended to examine the impact of GenAI on SP on a larger scale by increasing the sample size in the quantitative aspect while maintaining the depth of insights in the qualitative aspect.

This current study was limited to researchers from King Abdulaziz University to adhere to the unified ethical context approved by the University’s CUED, and to comply with recognized global policies such as WAME policies. So that researchers’ practices can be examined and selected within a unified ethical context that researchers are fully aware of.

In addition, the cost and accessibility of GenAI may influence researchers' perceptions of the potential benefits of the technology, which was considered in the current study where participants were selected to have a full subscription to at least one GenAI application so that they would have a full perception of all the potential. Nevertheless, comparing free versus paid use of GenAI applications could be an introduction to a new type of study examining the impact of usage patterns on SP practices and GenAI.

8 CONCLUSION

This study reveals the enormous potential of GenAI to transform SP. The most important implications of using GenAI in SP can be summarized in the following points:

- For researchers: enhancing creativity, facilitating collaboration, improving the quality of writing, accelerating the publishing process, and a deeper understanding of the impact of research.
- For research institutions: increasing productivity and efficiency, encouraging research collaboration, improving the quality of research outputs, and directing research investments in an informed manner.
- For the field of SP as a whole: accelerating the pace of publishing, improving the quality of publishing, increasing the dissemination of knowledge, developing evaluation criteria, and the emergence of new roles for workers in the field of SP related to GenAI.

Based on the findings of the current study, GenAI holds promising potential to bring about a transformation in SP. However, it is important to emphasize that its role is still under development, and it should be treated as a supplementary tool for researchers that cannot replace their creative and critical role. Therefore, researchers must use this technology with caution and awareness while maintaining standards of quality and scientific ethics.

The current study opens the door for further future studies to explore other aspects of GenAI's impact on PS, such as its impact on research ethics, the development of new standards for assessing research quality, and its impact on the relationship between researchers, research institutions, and publishing houses.

9 REFERENCES

- [1] J. C. Madden *et al.*, "Journeying through journals: The publishing process and how to maximise research impact," *Alternatives to Laboratory Animals*, vol. 52, no. 6, pp. 334–351, 2024. <https://doi.org/10.1177/02611929241286624>
- [2] M. Basu, "Importance of research in education," *SSRN*, 2020. <https://doi.org/10.2139/ssrn.3703560>
- [3] R. Villela, "The importance of research for the aspiring young scientists," *International Journal of Clinical Research*, vol. 3, no. 1, pp. 1–2, 2023. <https://doi.org/10.38179/ijcr.v3i1.199>
- [4] P. C. E. Szluka and B. Gyórfy, "Relationship between bibliometric indicators and university ranking positions," *Scientific Reports*, vol. 13, p. 14193, 2023. <https://doi.org/10.1038/s41598-023-35306-1>

- [5] I. Dobos and P. Sasvári, “Statistical analysis of QS World University Rankings 2021 university rankings using Scopus/SciVal databases,” *Regional Statistics*, vol. 14, pp. 768–792, 2024. <https://doi.org/10.15196/RS140407>
- [6] A. C. Estrada-Real and F. J. Cantu-Ortiz, “A data analytics approach for university competitiveness: The QS world university rankings,” *International Journal on Interactive Design and Manufacturing (IJIDeM)*, vol. 16, pp. 871–891, 2022. <https://doi.org/10.1007/s12008-022-00966-2>
- [7] L. Zhi Lin, “Generative AI and mobile learning in higher education: Comparing student and faculty perspectives on employability impact,” *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 19, no. 1, pp. 34–45, 2025. <https://doi.org/10.3991/ijim.v19i01.51325>
- [8] S. Zhou, Y. Si, J. Li, O. Manta, and G. X.-G. Yue, “A study of generative artificial intelligence on mobile learning adoption based on SEM models,” *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 18, no. 22, pp. 68–76, 2024. <https://doi.org/10.3991/ijim.v18i22.52343>
- [9] S. Altikriti and Z. Nemrawi, “The use of ChatGPT as a learning tool among Jordanian students in technical universities: Attitudes and perceptions,” *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 19, no. 5, pp. 144–158, 2025. <https://doi.org/10.3991/ijim.v19i05.52049>
- [10] Y. K. Dwivedi, T. Malik, L. Hughes, and M. A. Albashrawi, “Scholarly discourse on GenAI’s impact on academic publishing,” *Journal of Computer Information Systems*, pp. 1–16, 2024. <https://doi.org/10.1080/08874417.2024.2435386>
- [11] J. Madunić and M. Sovulj, “Application of ChatGPT in information literacy instructional design,” *Publications*, vol. 12, p. 11, 2024. <https://doi.org/10.3390/publications12020011>
- [12] M. K. Oliński and K. Sieciński, “Bibliometric overview of ChatGPT: New perspectives in social sciences,” *Publications*, vol. 12, p. 9, 2024. <https://doi.org/10.3390/publications12010009>
- [13] R. Golan, R. Reddy, A. Muthigi, and R. Ramasamy, “Artificial intelligence in academic writing: A paradigm-shifting technological advance,” *Nature Reviews Urology*, vol. 20, pp. 327–328, 2023. <https://doi.org/10.1038/s41585-023-00746-x>
- [14] A. Albasalah, S. Alshawwa, and R. Alarnous, “Use of artificial intelligence in activating the role of Saudi universities in joint scientific research between university teachers and students,” *PLoS ONE*, vol. 17, p. e0267301, 2022. <https://doi.org/10.1371/journal.pone.0267301>
- [15] T. K. Chiu, Q. Xia, X. Zhou, C. S. Chai, and M. Cheng, “Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education,” *Computers and Education: Artificial Intelligence*, vol. 4, p. 100118, 2023. <https://doi.org/10.1016/j.caeai.2022.100118>
- [16] J. R. de la Torre-López and J. R. Romero, “Artificial intelligence to automate the systematic review of scientific literature,” *Computing*, vol. 105, pp. 2171–2194, 2023. <https://doi.org/10.1007/s00607-023-01181-x>
- [17] S. Izadi and M. Forouzanfar, “Error correction and adaptation in conversational AI: A review of techniques and applications in Chatbots,” *AI*, vol. 5, pp. 803–841, 2024. <https://doi.org/10.3390/ai5020041>
- [18] M. Sallam *et al.*, “Evident gap between generative artificial intelligence as an academic editor compared to human editors in scientific publishing,” *Edelweiss Applied Science and Technology*, vol. 8, no. 6, pp. 960–979, 2024. <https://doi.org/10.55214/25768484.v8i6.2189>
- [19] E. Paz-Pacheco, “Generative artificial intelligence (AI) in scientific publications,” *J ASEAN Fed. Endocr. Soc.*, vol. 39, pp. 4–5, 2024. <https://doi.org/10.15605/jafes.039.01.01>

- [20] C. Zielinski *et al.*, "Chatbots, generative AI, and scholarly manuscripts: WAME recommendations on chatbots and generative artificial intelligence in relation to scholarly publications," *Current Medical Research and Opinion*, vol. 40, pp. 11–13, 2024. <https://doi.org/10.1080/03007995.2023.2286102>
- [21] L. W. Roberts, "Addressing the novel implications of generative AI for academic publishing, education, and research," *Acad. Med.*, vol. 99, pp. 471–473, 2024. <https://doi.org/10.1097/ACM.0000000000005667>
- [22] S. Akgun and C. Greenhow, "Artificial intelligence in education: Addressing ethical challenges in K-12 settings," *AI and Ethics*, vol. 2, pp. 431–440, 2022. <https://doi.org/10.1007/s43681-021-00096-7>
- [23] M. A. Cappelli and G. Di Marzo Serugendo, "A semi-automated software model to support AI ethics compliance assessment of an AI system guided by ethical principles of AI," *AI and Ethics*, vol. 5, pp. 1357–1380, 2024. <https://doi.org/10.1007/s43681-024-00480-z>
- [24] M. Mohammad Amini, M. Jesus, D. Fanaei Sheikholeslami, P. Alves, A. Hassanzadeh Benam, and F. Hariri, "Artificial intelligence ethics and challenges in healthcare applications: A comprehensive review in the context of the European GDPR mandate," *Machine Learning and Knowledge Extraction*, vol. 5, pp. 1023–1035, 2023. <https://doi.org/10.3390/make5030053>
- [25] F. S. D. Palmisani and J. Vollert, "Navigating the light and shadow of scientific publishing faced with machine learning and generative AI," *European Journal of Pain*, vol. 29, no. 3, p. e4736, 2024. <https://doi.org/10.1002/ejp.4736>
- [26] CUED, *Guide and Policies for the use of Artificial Intelligence in Education and Scientific Research at King Abdulaziz University*, 1st ed., Jeddah, Saudi Arabia: King Abdulaziz University, 2024.
- [27] J. P. Chubb and D. Reed, "Speeding up to keep up: Exploring the use of AI in the research process," *AI & Society*, vol. 37, pp. 1439–1457, 2022. <https://doi.org/10.1007/s00146-021-01259-0>
- [28] D. Ifenthaler *et al.*, "Artificial intelligence in education: Implications for policymakers, researchers, and practitioners," *Technology Knowledge and Learning*, vol. 29, pp. 1693–1710, 2024. <https://doi.org/10.1007/s10758-024-09747-0>
- [29] C. Chauhan, "The impact of generative artificial intelligence in scientific content synthesis for authors," *The American Journal of Pathology*, vol. 194, pp. 1406–1408, 2024. <https://doi.org/10.1016/j.ajpath.2024.06.002>
- [30] W. O. Alsayed, F. S. Al-Hafdi, and W. S. Alhalafawy, "Chatbots in education," in *Empowering STEM Educators with Digital Tools*, 1st ed., S. Papadakis and M. Kalogiannakis, Eds., Hershey, USA: IGI Global Scientific Publishing, Hershey, USA, 2024, pp. 137–154. <https://doi.org/10.4018/979-8-3693-9806-7.ch006>
- [31] T. S. Alharbi, F. S. Al-Hafdi, and W. S. Alhalafawy, "Exploring the framework for intelligent operations (FiOps) for Teachers in the era of generative AI (GenAI)," *International Journal of Learning, Teaching and Educational Research*, vol. 24, pp. 942–964, 2025. <https://doi.org/10.26803/ijlter.24.8.42>
- [32] Z. Lv, "Generative artificial intelligence in the metaverse era," *Cognitive Robotics*, vol. 3, pp. 208–217, 2023. <https://doi.org/10.1016/j.cogr.2023.06.001>
- [33] G. Gebresenbet *et al.*, "A concept for application of integrated digital technologies to enhance future smart agricultural systems," *Smart Agricultural Technology*, vol. 5, p. 100255, 2023. <https://doi.org/10.1016/j.atech.2023.100255>
- [34] S. Pal, "A paradigm shift in research: Exploring the intersection of artificial intelligence and research methodology," *International Journal of Innovative Research in Engineering & Multidisciplinary Physical Sciences*, vol. 11, no. 3, 2023. <https://doi.org/10.37082/IJIRMPS.v11.i3.230125>
- [35] M. Gerlich, "Perceptions and acceptance of artificial intelligence: A multi-dimensional study," *Social Sciences*, vol. 12, no. 9, p. 502, 2023. <https://doi.org/10.3390/socsci12090502>

- [36] D. Jungwirth and D. Haluza, "Artificial intelligence and public health: An exploratory study," *International Journal of Environmental Research and Public Health*, vol. 20, p. 4541, 2023. <https://doi.org/10.3390/ijerph20054541>
- [37] B. Burger, D. K. Kanbach, S. Kraus, M. Breier, and V. Corvello, "On the use of AI-based tools like ChatGPT to support management research," *European Journal of Innovation Management*, vol. 26, pp. 233–241, 2023. <https://doi.org/10.1108/EJIM-02-2023-0156>
- [38] C. S. Narayanaswamy, "Can we write a research paper using artificial intelligence?" *Journal of Oral and Maxillofacial Surgery*, vol. 81, no. 5, pp. 524–526, 2023. <https://doi.org/10.1016/j.joms.2023.01.011>
- [39] H. Mondal and S. Mondal, "How artificial intelligence can help researchers in the promotion of their articles?" *Indian Journal of Ophthalmology*, vol. 71, no. 5, pp. 2293–2294, 2023. https://doi.org/10.4103/IJO.IJO_296_23
- [40] Q. Sun, "Exploring human-generative AI interaction in L2 learners' source use practices: Issues, trials, and critical reflections," *Journal of Academic Writing*, vol. 14, no. 1, pp. 24–42, 2024. <https://doi.org/10.18552/joaw.v14i1.1055>
- [41] C.-T. Wu, "Applications of AI in educational research series (II): Using connected papers for literature review," *Journal of Education Research*, pp. 157–164, 2024.
- [42] R. Wong, "Role of generative artificial intelligence in publishing. What is acceptable, what is not," *The Journal of ExtraCorporeal Technology*, vol. 55, no. 3, pp. 103–104, 2023. <https://doi.org/10.1051/ject/2023033>
- [43] S. Frangou, U. Volpe, and A. Fiorillo, "AI in scientific writing and publishing: A call for critical engagement," *Eur. Psychiatry*, vol. 68, p. e98, 2025. <https://doi.org/10.1192/j.eurpsy.2025.10061>
- [44] O. E. Apata, O.-M. Kwok, and Y.-H. Lee, "The use of generative artificial intelligence (AI) in academic research: A review of the consensus app," *Cureus*, vol. 17, no. 7, p. e87297, 2025. <https://doi.org/10.7759/cureus.87297>
- [45] M. Shukla, I. Goyal, B. Gupta, and J. Sharma, "A comparative study of ChatGPT, Gemini, and Perplexity," *International Journal of Innovative Research in Engineering & Management (IJIRCST)*, vol. 12, no. 4, pp. 10–15, 2024. <https://doi.org/10.55524/ijircst.2024.12.4.2>
- [46] M. A. Segooa, F. S. Modiba, and I. Motjolo-pane, "Generative artificial intelligence tools to augment teaching scientific research in postgraduate studies," *South African Journal of Higher Education*, vol. 39, pp. 300–320, 2025. <https://doi.org/10.20853/39-1-6275>
- [47] R. F. Fenske and J. A. A. Otts, "Incorporating generative AI to promote inquiry-based learning: Comparing elicited AI research assistant to PubMed and CINAHL complete," *Medical Reference Services Quarterly*, vol. 43, pp. 292–305, 2024. <https://doi.org/10.1080/02763869.2024.2403272>
- [48] C. Lal and S. Paul, "How generative AI Can boost scientific research: Exploring its uses, challenges, and what's next?" *Journal of Data Science, Informetrics, and Citation Studies*, vol. 4, pp. 1–8, 2025. <https://doi.org/10.5530/jcitation.20250173>
- [49] S. Panda and D. N. Kaur, "Exploring the role of generative AI in academia: Opportunities and challenges," *IP Indian Journal of Library Science and Information Technology*, vol. 9, no. 1, pp. 12–23, 2024. <https://doi.org/10.18231/j.ijlsit.2024.003>
- [50] B. Bordalejo, D. Pafumi, F. Onuh, A. K. M. I. Khalid, M. S. Pearce, and D. P. O'Donnell, "'Scarlet cloak and the forest adventure': A preliminary study of the impact of AI on commonly used writing tools," *International Journal of Educational Technology in Higher Education*, vol. 22, p. 6, 2025. <https://doi.org/10.1186/s41239-025-00505-5>
- [51] C. Saroj, S. Singh, A. Budhiraja, and S. Chopra, "Resume summarization—An application of generative AI," in *NIELIT's International Conference on Communication, Electronics and Digital Technologies*, 2024, pp. 597–613. https://doi.org/10.1007/978-981-97-3604-1_40
- [52] A. Mahdavi Goloujeh, A. Sullivan, and B. Magerko, "The social construction of generative AI prompts," in *Extended Abstracts of the 2024 CHI Conference on Human Factors in Computing Systems*, 2024, pp. 1–7. <https://doi.org/10.1145/3613905.3650947>

- [53] P. Gupta, R. Mahajan, U. Badhera, and P. S. Kushwaha, "Integrating generative AI in management education: A mixed-methods study using social construction of technology theory," *The International Journal of Management Education*, vol. 22, p. 101017, 2024. <https://doi.org/10.1016/j.jjme.2024.101017>
- [54] S. Ivanov, M. Soliman, A. Tuomi, N. A. Alkathiri, and A. N. Al-Alawi, "Drivers of generative AI adoption in higher education through the lens of the Theory of Planned Behaviour," *Technology in Society*, vol. 77, p. 102521, 2024. <https://doi.org/10.1016/j.techsoc.2024.102521>
- [55] M. Z. T. Zaki *et al.*, "The effect of mobile search retrieval types on self-regulated learning among middle school students," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3382–3392, 2024. <https://doi.org/10.62754/joe.v3i8.5005>
- [56] X. Zhou and L. Schofield, "Using social learning theories to explore the role of generative Artificial Intelligence (AI) in collaborative learning," *Journal of Learning Development in Higher Education*, no. 30, pp. 1–12, 2024. <https://doi.org/10.47408/jldhe.vi30.1031>
- [57] F. M. Alnimran and W. S. Alhalafawy, "Qualitative exploration of the opportunities and challenges of online training according to the behavioral intention variables of the most trained teachers during the COVID-19 pandemic," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 8, p. 4837, 2024. <https://doi.org/10.24294/jipd.v8i8.4837>
- [58] N. T. Alrashedi, S. M. H. Alsulami, A. I. Flatah, A. H. Najmi, and W. S. Alhalafawy, "The effects of gamified platforms on enhancing learners' Ambition," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3393–3304, 2024. <https://doi.org/10.62754/joe.v3i8.5004>
- [59] N. T. Alrashedi, A. H. Najmi, and W. S. Alhalafawy, "Utilising gamification to enhance ambition on digital platforms: An examination of faculty members perspectives in times of crisis," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3404–3416, 2024. <https://doi.org/10.62754/joe.v3i8.5003>
- [60] H. O. Ibrahim, F. S. Al-Hafdi, and W. S. Alhalafawy, "Ethnographic insights of educational digital life behaviours: A study of affluent schools," *Journal of Ecohumanism*, vol. 3, pp. 4413–4428, 2024.
- [61] A. H. Najmi, Y. R. Alameer, and W. S. Alhalafawy, "Exploring the enablers of IoT in education: A qualitative analysis of expert tweets," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 10, p. 5079, 2024. <https://doi.org/10.24294/jipd.v8i10.5079>
- [62] M. Z. T. Zaki, W. Y. El-Refai, A. H. Najmi, F. S. Al-Hafdi, W. S. Alhalafawy, and F. M. Abd El Bakey, "The effect of educational activities through the flipped classroom on students with low metacognitive thinking," *Journal of Ecohumanism*, vol. 3, no. 4, pp. 2476–2491, 2024. <https://doi.org/10.62754/joe.v3i4.3770>
- [63] A. M. Zohdi, F. S. Al-Hafdi, and W. S. Alhalafawy, "The role of digital platforms in studying the holy Qur'an: A case study based on the voices of students from diverse cultures at the Prophet's Mosque," *Journal of Ecohumanism*, vol. 3, no. 7, pp. 3050–3062, 2024. <https://doi.org/10.62754/joe.v3i7.4440>
- [64] J. W. Creswell and C. N. Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Thousand Oaks, CA: Sage Publications, 2016.
- [65] M. E. Klinke and A. V. Fernandez, "Taking phenomenology beyond the first-person perspective: Conceptual grounding in the collection and analysis of observational evidence," *Phenomenology and the Cognitive Sciences*, vol. 22, pp. 171–191, 2023. <https://doi.org/10.1007/s11097-021-09796-1>
- [66] P. Stilwell and K. Harman, "Phenomenological research needs to be renewed: Time to integrate enactivism as a flexible resource," *International Journal of Qualitative Methods*, vol. 20, 2021. <https://doi.org/10.1177/1609406921995299>
- [67] J. Lewis and S. Holm, "Patient autonomy, clinical decision making, and the phenomenological reduction," *Medicine, Health Care and Philosophy*, vol. 25, pp. 615–627, 2022. <https://doi.org/10.1007/s11019-022-10102-2>

- [68] G. B. A. Guest and L. Johnson, “How many interviews are enough?: An experiment with data saturation and variability,” *Field Methods*, vol. 18, pp. 59–82, 2006. <https://doi.org/10.1177/1525822X05279903>
- [69] S. Mashuri, M. Sarib, A. Rasak, F. Alhabsyi, and H. Syam, “Semi-structured interview: A methodological reflection on the development of a qualitative research instrument in educational studies,” *IOSR Journal of Research & Method in Education (IOSR-JRME)*, vol. 12, pp. 22–29, 2022. <https://doi.org/10.9790/7388-1201052229>
- [70] C. Kakilla, “Strengths and weaknesses of semi-structured interviews in qualitative research: A critical essay,” *Preprints*, 2021. <https://doi.org/10.20944/preprints202106.0491.v1>
- [71] H. H. Y. Kheddar and A. I. Awad, “Deep transfer learning for intrusion detection in industrial control networks: A comprehensive review,” *Journal of Network and Computer Applications*, vol. 220, p. 103760, 2023. <https://doi.org/10.1016/j.jnca.2023.103760>

10 AUTHORS

Meshari Rizqallah Alsulami is a Researcher at the Educational Technology Department, Faculty of Education, King Abdulaziz University, Saudi Arabia, and currently serves as the Director of the Scholarships Department with research interests in the fields of AI in Education, Gamification, Instructional design, E-learning, and Digital Platform (E-mail: mralsulami@kau.edu.sa).

Dr. Fahad Saleem Al-Hafdi is an Associate professor, at the Educational Technology Department, Faculty of education, King Abdulaziz University, Saudi Arabia with research interests in the field of e-Learning, gamification, and augmented reality (E-mail: falhafdi@kau.edu.sa).

Prof. Waleed Salim Alhalafawy is a Professor at the Educational Technology Department, Faculty of Education, King Abdulaziz University, Saudi Arabia with research interests in the fields of generative AI, gamification, extended reality, mobile learning, adaptive learning, and digital platforms (E-mail: welhlafawy@kau.edu.sa).