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Development of a Rapid Assessment Method for Responsible Use of Generative AI in Scientific Research: Application to the Ugandan Research Context

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Short Report

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Abstract

Objective

Researchers are increasingly using generative artificial intelligence (GenAI) to support tasks such as literature review, academic writing, programming, data interpretation, and knowledge synthesis. We developed a Rapid Assessment Method for Responsible Use of Generative AI in Scientific Research (RAM-GenAI) to provide a practical approach for evaluating responsible practices in low- and middle-income settings like Uganda.

Results description

Rather than presenting long checklists of many individual requirements, RAM-Gen AI have five major areas of assessment. These are groups related to the principles of responsible GenAI use. They includes, transparency of AI use, verification of AI-generated outputs, data responsibility, human oversight, and reproducibility of AI-assisted research workflows. Each domain contains assessment criteria designed to identify strengths, risks, and areas requiring improvement. RAM-GenAI developed provides researchers and institutions with a practical approach for evaluating responsible GenAI practices before, during, or after AI-assisted research activities.

1. INTRODUCTION

In Uganda, researchers are quickly picking up Generative AI tools to help speed up their daily scientific tasks [1]. Common tools like ChatGPT and Gemini make it much easier to read through literature, clean up draft text, write code, and interpret raw data [2]. LLM and other GenAI systems can improve productivity by assisting researchers with complex tasks. But while these tools boost work speed, using them blindly creates big risks for accuracy and research ethics.AI can generate content that may appear accurate while containings errors, unsupported claims while faking references or even can fabricate information [3]. Researchers who use GenAI without appropriate verification processes may unintentionally introduce inaccuracies into manuscripts, analyses, or research outputs. In addition, unclear documentation of AI involvement may affect research transparency and reproducibility, making it difficult for others to understand how AI contributed to the final outcomes [4].

These recommendations are good while commonly emphasizing on principles such as transparency, human oversight, privacy protection, and verification of AI-generated information [5]. However, many existing guidelines provide broad ethical recommendations rather than practical assessment approaches that allow individual researchers to evaluate their own AI-assisted research workflows.

This challenge is particularly relevant in low- and middle-income countries, including Uganda, where access to generative AI tools is increasing among universities and research communities. Even though these technologies offer opportunities to support scientific productivity and reduce barriers to research activities, structured approaches for assessing responsible AI use within academic research environments remain limited [6]. Researchers and institutions may require simple tools that can identify potential risks and encourage good practices without requiring advanced technical expertise [7].

2. METHODS

2.1. Study Design

Our study used a methodological development approach to create a Rapid Assessment Method for Responsible Use of Generative Artificial Intelligence (GenAI) in scientific research. RAM-GenAI development process involved reviewing existing responsible AI principles, research integrity recommendations, and guidance on the use of artificial intelligence in scholarly activities [8] [9] [10]. The results generated, assessed were then contextualized for the Ugandan academic research environment and demonstrated using representative research scenarios.

The study did not involve human participants, collection of personal information, or access to confidential research data. Therefore, ethical approval was not required.

2.2. Development Process

The assessment method were developed through three flowing aspect and stages, these stages are describe below with the components it carries

Stage 1: Identification of responsible GenAI principles

An evidence synthesis of publicly available literature and guidance documents was conducted to identify key principles associated with responsible use of GenAI in scientific research. Sources considered included academic publications, research integrity recommendations, artificial intelligence governance guidance, and policies related to AI-assisted scholarly work [11] [12]. The review focused on identifying recurring concepts across five core areas: transparency and disclosure, verification of outputs, protection of research data and privacy, human responsibility and oversight, and workflow reproducibility. These principles formed the foundation for the assessment domains.

Stage 2: Development of the assessment method

The identified principles were converted into a structured assessment tool. Each principle was transformed into measurable assessment criteria that researchers could use to evaluate their own AI-assisted research activities.To prevent conceptual ambiguity, *Verification* is operationally defined as the technical validation and fact-checking of AI output accuracy, whereas *Human Oversight* specifically addresses researcher governance, final decision-making authority, and overall intellectual responsibility

Stage 3: Assessment Scoring Framework

A simple scoring approach was developed to allow rapid interpretation of responsible GenAI practices. Each assessment item is scored using a predefined scale based on the level of implementation. The total score reflects overall alignment with responsible practices: Where Low score means significant improvement needed, Moderate score stands for partial adoption, High score represent strong alignment. The system was intentionally designed to be clear and usable across academic fields without need specialized technical AI knowledge.

2.3. Uganda Contextualization and Case Demonstration

To show practical application, the method was contextualized using common AI-assisted research tasks among university researchers in Uganda, including literature summarization, manuscript drafting, code generation/review, and data interpretation. Each scenario was evaluated using the RAM-GenAI criteria to show how the tool pinpoints strong practices and areas for improvement.

3. RESULTS

3.1. Development of the Rapid Assessment Method

The development process resulted in the **Rapid Assessment Method for Responsible Use of Generative Artificial Intelligence in Scientific Research (RAM-GenAI)**. The method was designed as a practical tool to help researchers evaluate the responsibility and transparency of their GenAI-assisted research activities. RAM-GenAI is organized around five domains that capture the core elements of responsible GenAI use in research [13–15]. and these RAM domains are as follows below.

1. Transparency of AI Use
2. Verification of AI-Generated Outputs
3. Data Responsibility
4. Human Oversight and Accountability
5. Reproducibility of AI-Assisted Research Workflows

Scoring Interpretation

This is how RAM-GenAI is scored and evaluated

1. 5 domains
2. 15 assessment criteria
3. Each criterion scored from 0–2

Maximum possible score:

15 criteria × 2 points = 30 points

The 15 criteria are scored from 0–2 (maximum 30 points) and classified into three practice levels: Developing (0–10 points), Emerging (11–20 points), and Established (21–30 points) as shown in Table 1.

Table 1
Rapid Assessment Method for Responsible Use of Generative AI in Scientific Research (RAM-GenAI) domains and assessment criteria

Domain	Purpose	Assessment Criteria	Score
1. Transparency of AI Use	Evaluates whether AI involvement in research activities is documented and communicated clearly.	AI tool/model used is identified	0 = Not documented 1 = Partially documented 2 = Fully documented
		Purpose of AI use is recorded	0 = Not documented 1 = Partially documented 2 = Clearly documented
		AI assistance is disclosed in research outputs where appropriate	0 = Not disclosed 1 = Inconsistent disclosure 2 = Appropriate disclosure
2. Verification of AI-Generated Outputs	Assesses whether researchers confirm the accuracy and reliability of AI-generated information.	AI-generated facts are checked against reliable sources	0 = Not checked 1 = Sometimes checked 2 = Routinely checked
		AI-generated references and citations are verified	0 = Not verified 1 = Partially verified 2 = Fully verified
		Errors or unsupported AI outputs are identified and corrected	0 = No correction process 1 = Limited correction 2 = Consistent correction
3. Data Responsibility	Evaluates whether research information is handled safely when using GenAI tools.	Sensitive or confidential information is protected	0 = No protection measures 1 = Some precautions taken 2 = Appropriate protection applied

Domain	Purpose	Assessment Criteria	Score
		Researchers consider privacy implications before using AI tools	0 = Not considered 1 = Partially considered 2 = Considered before use
		Appropriate AI platforms are selected for research activities	0 = No consideration 1 = Limited consideration 2 = Appropriate selection
4. Human Oversight and Accountability	Determines whether researchers maintain responsibility for AI-assisted outputs.	AI-generated content is reviewed by a researcher	0 = No review 1 = Limited review 2 = Complete review
		Final research decisions remain under human control	0 = AI determines decisions 1 = Shared reliance 2 = Researcher-controlled decisions
		AI outputs are critically evaluated before acceptance	0 = No evaluation 1 = Basic evaluation 2 = Critical evaluation
5. Reproducibility of AI-Assisted Workflows	Assesses whether AI-supported research processes can be understood and repeated.	AI tools and versions are recorded	0 = Not recorded 1 = Partially recorded 2 = Fully recorded
		Important prompts or instructions are documented	0 = Not documented 1 = Some documentation 2 = Complete documentation
		AI-assisted research steps are described	0 = Not described 1 = Partially described

Domain	Purpose	Assessment Criteria	Score
			2 = Clearly described

3.2. RAM-GenAI Assessment Workflow and domains division

The developed RAM-GenAI method follows a structured workflow that guides researchers from identifying an AI-assisted research activity to evaluating responsible AI practices and identifying areas for improvement. For RAM-GenAI to be evaluated well, there are five stages that it has to go through. These stages are; defining the AI-assisted activity, applying the assessment domains, calculating the assessment score, classifying the level of responsible AI practices and identify improvement opportunities. All these structural workflows for the proposed assessment method are detailed in Fig. 1 below.

RAM-GenAI workflow is designed to provide a rapid and practical assessment process that can be applied across different scientific disciplines. The method does not replace institutional AI policies or ethical review processes but provides researchers with a structured approach for reflecting on and improving their GenAI-assisted research practices.

3.3. Case Demonstration in the Ugandan Research Context

The developed method was demonstrated using common examples of GenAI use among university researchers in Uganda.

Example 1

(AI-assisted Literature Review):

A researcher uses GenAI tools like ChatGPT or Gemini to summarize published studies. Applying RAM-GenAI showed that the tool name was recorded (Implemented) and summaries were double-checked against original papers (Implemented), but AI-generated references were accepted without verification (Not implemented) and prompts were unrecorded (Partially implemented). The method highlighted verification and documentation as immediate areas to fix.

Example 2

(AI-assisted Manuscript Preparation): A researcher uses GenAI to polish language clarity. AI assistance was disclosed (Implemented) and final content was human-reviewed (Implemented), but confidential unpublished data was uploaded into a public AI tool (Not implemented). RAM-GenAI flagged a severe safety issue under Data Responsibility, guiding data protection adjustments.

4. LIMITATIONS

The RAM-GenAI tool was conceptualized based on established guidelines and demonstrated using qualitative scenarios. However, it has not yet undergone empirical testing, such as pilot testing among practicing researchers, inter-rater reliability assessments, or formal usability evaluation. Also, certain criteria across assessment domains specifically between Human Oversight and Verification share conceptual boundaries that

require further operational refinement in future iterations. While RAM-GenAI is tailored to highlight challenges in low- and middle-income settings using a Ugandan case focus, the assessment criteria are broadly structured and do not explicitly capture specific local institutional constraints, such as internet bandwidth limitations, institutional software licensing, or local IRB policies.

5. DISCUSSION

The proposed method emphasizes five key areas: transparency, verification of AI-generated outputs, data responsibility, human oversight, and reproducibility [14]. These areas reflect commonly recognized principles in responsible AI and scientific integrity. By organizing these principles into an assessment framework, RAM-GenAI allows researchers to identify specific strengths and weaknesses in their use of generative AI tools rather than relying only on general recommendations.

While RAM-GenAI offers a lightweight framework, it serves as a preliminary guidline rather than a fully validated diagnostic tool. Future empirical studies are required to evaluate its inter-rater reliability and usability across active research groups in Uganda and similar regional environments. Additionally, as local institutions introduce formal AI governance policies, the RAM-GenAI criteria must be updated to align with evolving national regulatory frameworks.

Despite these limitations, RAM-GenAI provides a practical foundation for supporting responsible adoption of generative AI in scientific research. The method can serve as a starting point for researchers and institutions seeking to encourage transparency, accountability, and reproducibility in AI-assisted research activities [16] [17].

6. CONCLUSION

As AI technologies and institutional policies continue to grow and expand, the framework can be refined and validated across different research settings.RAM-GenAI can support researchers and academic institutions in identifying opportunities to improve responsible use of generative AI tools. Although the method was developed within the Ugandan research context, its principles may be applicable to other research environments where generative AI adoption is increasing. The framework itself can be improved further to evaluate reliability, and applicability of the method across different disciplines and institutional settings. Meaning, this developed framework provides a foundation for future work on promoting transparent, accountable, and reproducible use of generative AI in scientific research.

Abbreviations

1. **AI**
Artificial Intelligence
2. **GenAI**
Generative Artificial Intelligence
3. **LLM**
Large Language Model
4. **LMIC**

Low- and Middle-Income Country
5. **RAM-GenAI**
Rapid Assessment Method for Responsible Use of Generative AI in Scientific Research
6. **REC**
Research Ethics Committee

Declarations

Ethics Approval and Consent to Participate

Not applicable. The study involved methodological development and simulated scenarios without human participants or private data.

Consent to Publish

Not applicable.

Data Availability and Supplementary Material

All materials developed as part of this study, including the RAM-GenAI assessment criteria, scoring framework, and user guidelines, are provided in **Supplementary File 1** to support adaptation and reuse by researchers and institutions.

Competing Interests

The author declares no competing interests.

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Authors' Contributions

Omara Innocent designed the methodology, synthesized the framework, evaluated the case scenarios, and drafted the manuscript all

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Declaration of Generative AI in Scientific Writing

The authors used ChatGPT an OpenAI during the preparation of this manuscript to support language editing, improve sentence clarity, enhance the organization of ideas, and refine the presentation of the manuscript. The AI tool was not used to generate research data, perform data analysis, interpret findings, or draw scientific conclusions. All methodological decisions, framework development, interpretation of results, and the final

content of the manuscript were developed, reviewed, and approved by the authors. The authors take full responsibility for the accuracy, integrity, and originality of the work presented.

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Figures

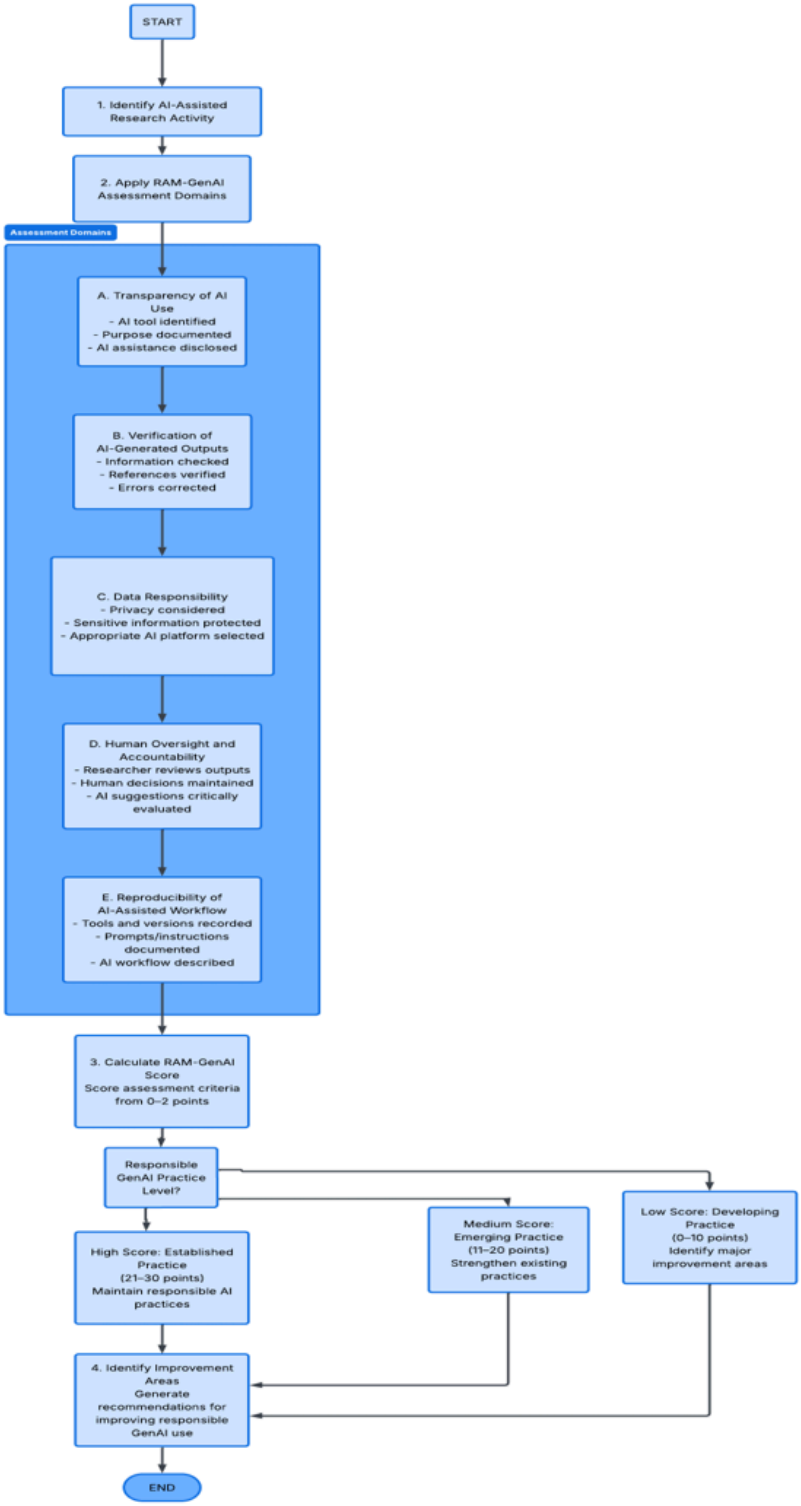


Figure 1

Represents the overall workflow of the proposed assessment method.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryFile1.docx