Education in Practice

Generative AI tools among applied health sciences students: the GROWL initiative

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Abstract

Background: "Generative Resources for Optimised Writing and Learning" (GROWL) is a series of seminars on generative artificial intelligence (GAI) tools to support the learning of students enrolled on the Master of Public Health and MSc Health Research Methods programmes at the University of Birmingham. We introduced this innovation in 2023-24 to incentivise an ethical and critical use of GAI tools while promoting the University's guidance on its use.

Objectives: This case study explores the design, implementation, and outcomes of the GROWL initiative, which aims to enhance students' GAI literacy. GROWL attempts to provide a baseline level of skills and competence vital for future employability and working life.

Approach: We evaluated the GROWL activity using quantitative evidence from an initial introductory session during the "Academic Skills Day" in October 2023, and compared it with a final session, focusing on data analysis in May 2024. We reviewed the feedback from the final session and applied a qualitative evaluation, using the Diffusion of Innovations theory and the AI device use and acceptance (AIDUA) model to interpret how students perceive and use AI.

Results: The final session was well received and evaluated, with students appreciating learning about and clarifying University guidance. Compared to the first session, the proportion of students declaring using GAI tools increased. These users can be considered a small sample of "innovators" and "early adopters" according to the Diffusion of Innovations theory. Many students felt more confident using GAI tools after the final GROWL session. However, some students shared concerns about the limitations of GAI tools and their ability to use them. Module and programme leads should continue building capacity to reinforce ethical GAI use across the curriculum.

Introduction

In recent years, generative artificial intelligence (GAI) advancements have shaken the whole education sector, requiring schools, colleges, and universities to quickly update their programmes to prepare students for the next generation of jobs. The "fourth industrial revolution", as defined by the World Economic Forum's founder (Schwab, 2017), highlights the growth of cyber-physical systems that rely on AI and machine learning predictive models to facilitate decision-making and automate laborious tasks. The WEF has published a series of White Papers reflecting on the "jobs of the future", with AI having a prominent role (Ratcheva *et al.*, 2020) in facilitating the work of future generations. In a recent White Paper, Di Battista and colleagues reflected on the skills needed to master large language models (e.g. ChatGPT, Copilot, Gemini), suggesting that the future workforce will need to excel in abstract reasoning, AI-prompting, critical thinking, and creative problem-solving; develop high levels of information, media, and digital literacy; and have an awareness of cybersecurity and AI ethics (Di Battista *et al.*, 2023).

In response to this growing demand for GAI-related employability skills, the Russell Group published a set of principles for AI use in education (The Russell Group, 2024). These principles urge universities to support and encourage students and staff to become more AI-literate, adapting teaching and assessment to incorporate ethical use of AI and upholding academic rigour and integrity (The Russell Group, 2024). In July 2023, the University of Birmingham adopted these guiding principles and produced guidelines for students and staff that intended to create opportunities to enhance their AI literacy (University of Birmingham, 2023). In response to these efforts, at the beginning of the academic year 2023-24, we introduced these guidelines to our cohort of Master of Public Health (MPH) and MSc Health Research Methods (HRM) students during a session on GAI that formed part of an "Academic Skills Day" (23 October 2023). In that session, many students shared concerns about GAI. They requested more explicit guidance about what to do and how to use GAI tools to support their learning without falling foul of Regulations on Academic Integrity. These are typical concerns related to AI literacy, a complex concept that is also rapidly evolving, along with the technology and tools available (Ng *et al.*, 2021; Sperling *et al.*, 2024). MPH/HRM students at the University of Birmingham represent a diverse cohort of home and international PGT students with varied disciplinary

backgrounds and levels of literacy. Our students come from diverse backgrounds, cultures, and countries where AI tools and their use may be restricted or accepted but not routinely used. For example, some cross-sectional studies investigating the adoption of GAI in higher education institutions overseas revealed that AI literacy is a prerequisite for students becoming proficient users and avoiding plagiarism issues (Chen *et al*., 2024; Wang *et al*., 2024). Some studies indicated ethical considerations and cognitive skills as essential factors influencing the adoption of these tools in surveys conducted in the USA (Chen *et al*., 2024) and China (Wang *et al*., 2024).

Objectives

In response to the informal 'needs assessment' undertaken during the "Academic Skills Day", we launched seminar sessions on GAI entitled "Generative Resources for Optimised Writing and Learning" (GROWL). These seminars were outside the curriculum but aligned with the curriculum delivery timeline, broadly following the timeline for dissertation development. This initiative aimed to incentivise an ethical and critical use of GAI tools to support students' learning while reinforcing University guidance (University of Birmingham, 2023). GROWL consisted of seminars and hands-on sessions to test and try AI tools for different tasks aligned with the timeline of the MPH/HRM curriculum, and the design of seminars was informed by consultations with selected members of staff of the School of Health Sciences (Department of Applied Health Sciences) keen on exploring and integrating AI into their teaching and learning practices. This collaborative approach aimed to tailor content to both the practical applications relevant to MPH/HRM students and the broader educational goals of the university.

The GROWL initiative at the University of Birmingham demonstrates how structured seminars on generative AI tools can enhance AI literacy among applied health research students, fostering ethical and critical engagement while addressing barriers to adoption and future employability through evidence-based evaluation and theoretical frameworks like Diffusion of Innovations and AI Device Use Acceptance (AIDUA) model.

Approach

In this article, we reflect on the GROWL initiative and discuss the evaluation feedback received in the final session (23 May 2024). As this initiative reflects on

quality improvement, which is not a research activity, no ethical approval was sought. The initiative consisted of three seminars:

Session 1 focused on "Generative AI Prompting" (30 November 2023). The session provided an overview of AI tools and demonstrations on how to prompt tools to undertake specific tasks such as developing a study plan (ChatGPT); how to undertake a basic literature review (ChatGPT, Elicit, and Litmaps); how to create summaries of published evidence (Elicit); critically analysing documents (ChatGPT); referencing (ChatGPT); editing data analysis code for statistical software (ChatGPT); creating presentation slides (Tome.app); identifying subject-related key issues (ChatGPT); and generating graphs and images (GraphMaker and Copilot).

Session 2 focused on "Building the rationale for your dissertation" (17 January 2024). The session aimed to demonstrate how to use GAI tools to perform scoping searches and identify key resources and literature in preparation for developing dissertation project protocols due for presentation in February. Specifically, the session provided suggestions on how to find essential information, conduct preliminary scoping searches, prepare critical summary tables (using Elicit, Perplexity), and refine research questions.

Session 3 aimed to explore GAI tools that students could use to assist quantitative and qualitative data analyses (23 May 2024), with the timing aligned to the needs of students working on their final dissertation reports over the summer. The session included a demonstration of generating STATA code that could be adapted for specific uses (ChatGPT), what to consider when conducting qualitative data analyses (with ChatGPT and Copilot), and how to use GAI tools for summarising and extracting data for literature reviews (Elicit and Perplexity).

Evaluation

We evaluated the GROWL initiative through several indicators collected through interactive polls (Slido) and a Microsoft Form at the end of the final session. We considered the following outcomes:

Session evaluation: The evaluation form included questions about the final session on data analysis, including the following 11-point scale items:

"How satisfied are you with the seminar?" (0=not at all satisfied; 10=extremely satisfied),

"How likely are you to recommend it to a colleague?" (0=not at all likely, 10=extremely likely).

"Overall, how would you rate the seminar?" (5 stars, 1=poor, 5=excellent).

We used 5-point Likert-type scales for the following items:

"How clear were its objectives?" (1=not at all clear, 5=very clear),

"How well organised was it?" (1=not at all organised, 5=extremely organised),

"How would you rate the instructors?" (1=poor, 5=excellent).

We included open-ended questions:

"What did you like the most/the least about the seminar?" and

"What would you suggest to improve the seminar?".

Actual GAI use: We asked students whether they used any GAI tools during the first session (25 November 2023) using a Slido poll. In this session, we recorded 21 responses out of 61 participants (34% response rate). We asked the same question again in the final session (23 May 2024), attended by 14 students, and compared the proportions of those who answered at the beginning of the academic year (n=21) with those who responded at the end (n=11, 79% response rate).

We used Rogers' Diffusion of Innovations (Rogers, 2003) as the theoretical framework to describe students in terms of levels of innovation adoption, i.e. as segments of innovators (early adopters, late majority, etc.). We used Gursoy and colleagues' AI Device Use Acceptance (AIDUA) model as a framework to qualitatively organise and interpret the findings (Gursoy _et al_., 2019). The AIDUA model describes the willingness or refusal to adopt GAI tools as a function of the emotions associated with their use, which are influenced by the expectancies related to the performance (i.e., expectations associated with GAI utility and usefulness) and effort (Gursoy _et al_., 2019). Perceived and effort expectancies are induced by social influence (a similar concept to 'perceived social norm' in the theory of planned behaviour (Wang _et al_., 2024)) and by the concepts of "hedonic motivation" and "anthropomorphism" of GAI tools (Gursoy _et al_., 2019). Hedonic motivation is the fun and enjoyment people feel when using GAI tools, which is linked to the satisfaction they get from using them. Anthropomorphism refers to the perception of AI tools

having human-like qualities or traits. For GAI tools, this could mean that users imagine the tools knowing or caring about them, making them feel more relatable and more straightforward to trust (Gursoy *et al*., 2019). Some quantitative studies suggest hedonic motivation, anthropomorphism, and social pressure play a less prominent role in the model (Ma and Huo, 2023). These perceived factors are considered in the AIDUA model as indirect and distal factors to GAI use. Hence, we focused our interpretation of the model on the components of emotions and expectancies. In this case, we asked the students to reflect on the *emotionality* of GAI use (what scares you the most about GAI tools?) and their limitations, linking them to the primary constructs of the AIDUA model.

Skills development: The form also included questions about the confidence or ability to use GAI tools (How confident are you in using generative AI tools now?) on a 10-point scale linked with the *performance expectations*. This question was asked before and after the final session on data analysis. The form finally asked students to reflect on their learning and how they would use it in the future.

Results
Session Evaluation

The students who responded to the session evaluation questions (n=11 out of 14 participants) were generally satisfied (Mean=8.1/10, SD=1.4) and expressed a moderate intention to recommend it to colleagues (Mean=7.9/10, SD=1.7). The majority thought the session was very well organised and had very clear objectives (8/11, 89%); they provided good ratings for the instructors (4.2/5, SD=0.9) and provided a positive overall rating for the session (4.1/5, SD=0.9). Participants appreciated being introduced to different AI tools, the practical examples used, and the fact that they could try prompts on their computers as an interactive part of the session. Some participants expressed the intention to use GAI tools again in the future.

Actual GAI use

In the initial session, 4 out of 15 students (27%) declared they had already used GAI tools. At the final GROWL session, 8 out of 11 students (73%) declared using GAI tools before the seminar. In the final session, students expressed a moderate fear of AI tools (M=4.33, SD=0.82). Participants indicated various factors contributing to this perception (see Table 1 below). Using the AIDUA [artificially intelligent (AI) device

use acceptance(Gursoy *et al*., 2019)] model to interpret the open-ended responses, the most prominent worries were related to concerns about *information quality* and *credibility* of GAI tools (performance expectancy), followed by concerns about *academic integrity* and *plagiarism*; some students shared fears about their limited abilities and skills ("not being able to get the output I am looking for"), or self-efficacy. Finally, some students shared generalised pessimistic views and mistrust in GAI tools (negative emotions).

Comments (participant number)	Theme	AIDUA model elements
"The codes make sense line by line but together it's giving wrong answer" (1) "Incorrect information" (2) "Their credibility" (3) "Wrong information" (6) "Information being incorrect" (11) "Hallucinations" (14)	Information quality, credibility, and reliability	Performance expectancy
"AI plagiarising someone's work" (4) "Being in plagiarism" (8) "Getting caught using AI" (13)	Academic integrity	Performance expectancy
"Not being able to get the outcome that I am looking for" (5)	Self-efficacy	Perceived effort expectancy
"AI can control our life" (10) "They will control humanity. Terminator is here" (12)	Pessimistic views	Emotion

Open-ended comments to the question, "What scares you the most about generative AI tools?" – responses from students participating in the last GROWL session (n=14).

Skills Development

Students who participated in the final session and responded to the feedback form (n=9) indicated the same level of confidence in using GAI tools compared to the beginning of the session. The means and median values did not change (before 7.6, after 7.6), but the distribution of the responses became more skewed towards the right (see figure below), indicating a slight increase in confidence.
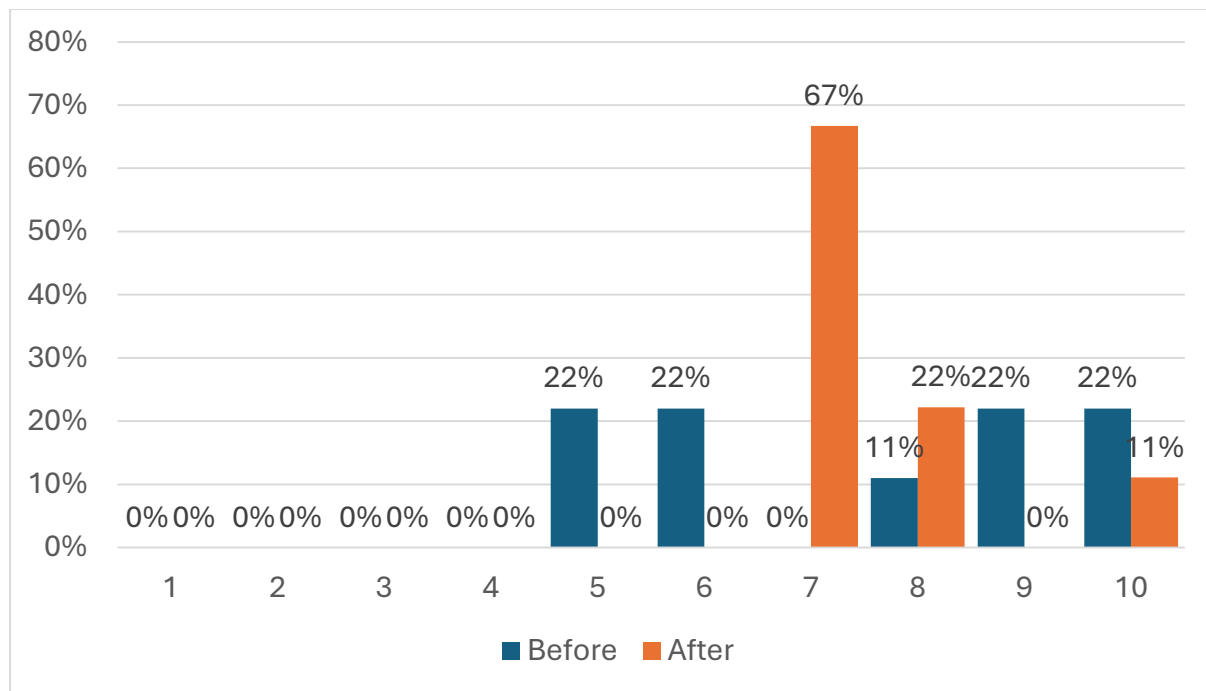
Distribution of responses to the question "How confident are you in using GAI tools?

Students who reflected on their learning with free text responses (n=7) appreciated receiving guidance, understanding "how to use GAI effectively", knowing "what AI can do and can't do", and how to use prompts to refine their questions. A student declared they had learned "the appropriate way AI should be used as an assisting tool and not as a substitute for learning."

Discussion
Session Evaluation

The final GROWL session was well received, and the participants felt it was informative and a valuable way to introduce and reinforce the University's guidance (University of Birmingham, 2023). The GROWL initiative helped students bridge the gap between theoretical knowledge and practical skills in GAI by focusing on hands-on learning and real-life applications. Some students appreciated learning about the guidance and having the chance to try out prompts and discuss how to use GAI effectively. The session we evaluated allowed us to reflect on the positive aspects and challenges of using GAI and students' literacy, perceptions, and emotional responses to GAI tools. While we have not formally assessed GAI literacy, considering the presence of different instruments and lack of standard definitions (Sperling *et al*., 2024), we understood that awareness and skill building were essential elements to enhance, along with an ethical, normative approach (Chen *et*

al., 2024; Wang *et al*., 2024). Many of our MPH/HRM students at the University of Birmingham come from diverse backgrounds, cultures, and countries where AI tools and their use may be restricted or accepted but not routinely used, hence constant guidance from instructors, module and programme leads is warranted.

Actual GAI use

In our small sample of students participating in the GROWL initiative, about half declared they were already using or considering adopting GAI tools. This is similar to what has been reported in cross-sectional studies in the USA (Chen *et al*., 2024) and China (Wang *et al*., 2024). While we cannot claim this accurately represents the prevalence of GAI use due to self-selection, response, and social desirability biases, we can observe that a significant proportion of this group of students use these tools. Under the Diffusion of Innovations theory lens (Rogers, 2003), these students can be regarded as the "innovators" and "early adopters", as defined by the theory. Those who declared they were not using the tools may be considered the "late majority" or even "laggards" (Rogers, 2003). Out of a total cohort of about 80 students, 8 out of 11 who attended the last session were considered innovators and early adopters, representing about 10% of the cohort. In the Diffusion of Innovation theory (Rogers, 2003), there is a broad assumption that the uptake of innovations follows an approximately Normal distribution, with the tails representing about 5-10% of the population. However, many of our students who attended the sessions still report not adopting these technologies. While there might be some under-reporting, it is clear from their responses that some students are particularly concerned about GAI, mistrusting the outputs and the reliability of the information output. This is linked with performance expectancy in AI device-use acceptance (AIDUA) (Gursoy *et al*., 2019). Negative emotions toward this relatively new technology may also explain why some students remain unconvinced and unwilling to adopt GAI for studying and learning.

Skills Development

Have these sessions contributed to developing GAI skills? The initiative was short-lived, and our formal evaluation considered only the final session. However, we did observe that whilst most participants (albeit a self-selecting group) felt confident about using GAI tools, some students remained fearful and reported not knowing how to use them appropriately. More effort is needed to build capacity, skills, and broader GAI literacy to reinforce University guidance. Critical skills and the ethical

use of GAI are essential elements to continue building into the whole curriculum (Chen *et al*., 2024; Wang *et al*., 2024).

Future iterations of GROWL could include a preparatory digital skills module to ensure all students begin with foundational AI knowledge (Wang *et al*., 2024). Additionally, incorporating staff training could further encourage integrating AI content and its use into courses. Integrating GAI into our MPH/HRM education provides valuable benefits in developing students' technical skills and preparing them for a technologically advanced workplace and the jobs of tomorrow (Di Battista *et al*., 2023). This initiative demonstrates the feasibility and potential benefits of such integration.

Limitations

The primary challenge encountered was the varied level of students' technical skills, which were not formally assessed. Additionally, limited time for in-depth AI learning within the curriculum required strategic content prioritisation, which was aligned with the dissertation's timeline. Other limitations include the small number of participants who provided responses relative to the MPH/HRM cohort size (selection bias, information bias).

Conclusion

This case study highlights the value of introducing formal opportunities to develop GAI skills in applied health science education programmes. The University of Birmingham's guidance must be reinforced through practical initiatives like GROWL and extended to make every contact count, building essential AI competencies throughout the curriculum. Future initiatives should build on this foundation, incorporating preparatory skills modules and advanced AI topics to support students' digital transformation. We also need to increase staff involvement throughout the programme to encourage GAI to use and improve their confidence in GAI tools. Further research is required to assess the long-term impacts of GAI training on AI literacy and establish the short-term effect of different educational activities. Longitudinal studies are also needed to establish whether AI-literacy-building curricula can have long-term implications for career outcomes in public health and health research methods programmes.

Acknowledgements

References

Chen, K., Tallant, A.C. and Selig, I. (2024) 'Exploring generative AI literacy in higher education: student adoption, interaction, evaluation and ethical perceptions' *Information and Learning Sciences*, (ahead-of-print). DOI:10.1108/ILS-10-2023-0160.

Di Battista, A., Hasselaar, E., Silva, A., *et al.* (2023) 'Jobs of Tomorrow: Large Language Models and Jobs', *World Economic Forum*. 2023. Available at: https://www.voced.edu.au/content/ngv:100417 (Accessed: 29 October 2024).

Gursoy, D., Chi, O.H., Lu, L., *et al.* (2019) 'Consumers' acceptance of artificially intelligent (AI) device use in service delivery', *International Journal of Information Management*, 49, pp. 157–169. DOI: 10.1016/j.ijinfomgt.2019.03.008.

Ma, X. and Huo, Y. (2023) 'Are users willing to embrace ChatGPT? Exploring the factors on the acceptance of chatbots from the perspective of AIDUA framework', *Technology in Society*, 75: 102362. DOI: 10.1016/j.techsoc.2023.102362.

Ng, D.T.K., Leung, J.K.L., Chu, S.K.W., *et al.* (2021) 'Conceptualizing AI literacy: An exploratory review', *Computers and Education: Artificial Intelligence*, 2: 100041. DOI: 10.1016/j.caeai.2021.100041.

Ratcheva, V., Leopold, T.A. and Zahidi, S. (2020) 'Jobs of tomorrow: mapping opportunity in the new economy', *World Economic Forum*. Available at: https://www.voced.edu.au/content/ngv:85635 (Accessed: 29 October 2024).

Rogers, E.M. (2003) *Diffusion of innovations*. 5th edn. New York: Free Press.

Schwab, K. (2017) *The fourth industrial revolution*. London: Portfolio Editions.

Sperling, K., Stenberg, C.-J., McGrath, C., *et al.* (2024) 'In search of artificial intelligence (AI) literacy in teacher education: A scoping review', *Computers and Education Open*, 6, 100169. DOI: 10.1016/j.caeo.2024.100169.

The Russell Group (2024) *New principles on use of AI in education*. Available at: https://russellgroup.ac.uk/news/new-principles-on-use-of-ai-in-education/ (Accessed: 1 August 2024).

University of Birmingham (2023) *Generative Artificial Intelligence and its role within teaching, learning and assessment*. Available at: https://www.birmingham.ac.uk/libraries/education-excellence/gai/index.aspx (Accessed: 29 October 2024).

Wang, C., Wang, H., Li, Y., *et al.* (2024) 'Factors Influencing University Students' Behavioral Intention to Use Generative Artificial Intelligence: Integrating the Theory of Planned Behavior and AI Literacy', *International Journal of Human–Computer Interaction*, 0 (0), pp. 1–23. DOI:10.1080/10447318.2024.2383033.