



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5th IFLA Symposium on Artificial Intelligence

**Upskilling the Next Generation of Research Support:
The Role of AI, Robotics, and Digital Transformation.
A Case Study of the University of Pretoria Library.**

**MR CHIPA MAIMELA
MR LATHOLA MCHUNU**

19 JUNE 2025



UNIVERSITY OF
KWAZULU-NATAL[™]
INYUVESI
YAKWAZULU-NATALI



IFLA Special Interest Group
Artificial Intelligence

CONTENTS

- ✓ Policies and guidelines support.
- ✓ Objectives
- ✓ Research process
- ✓ AI in research
- ✓ Digital literacy- Agentic AI sample
- ✓ Upskilling process
- ✓ Findings
- ✓ Conclusion



Supporting Institutional and Policy Frameworks

SA AI POLICY
FRAMEWORK

UP Guideline on
Ethical Governance

UP DIGITAL STRATEGY
WEBSITE
Digital literacy Tool

UP
AI
GUIDELINES
Design Assistant -
Academics- Students

LIBRARY

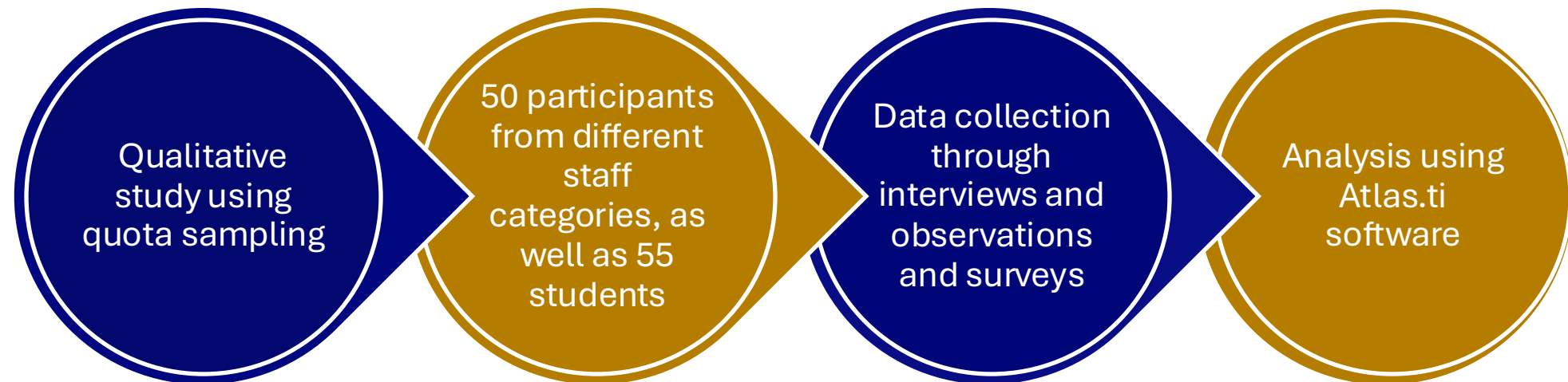
Plagiarism
Copyright
AI Committee
?

OBJECTIVE

- 1** Explore the impact of AI, robotics and digital transformation for research assistance.
- 2** Analyze the role of reskilling in bridging the skills gap.
- 3** Present a case study to illustrate best practices and challenges.
- 4** Provide recommendations for libraries navigating digital transformation.



THE STUDY APPROACH





Literature review highlights

- ✓ **Intelligent libraries: a review on expert systems, artificial intelligence, (Asemi et. al., 2021)**
- ✓ **Robotics Utilisation in Automatic Vision-Based Assessment Systems From Artificial Intelligence Perspective: A Systematic Review, (Alshammari, R.F.N. et al.,2022)**
- ✓ **Perceptions on adopting artificial intelligence and related technologies in libraries: public and academic librarians in North America,” Library Hi Tech (Yoon J et al., 2022),**
- ✓ **Upskilling and reskilling in the United Arab Emirates: Future-proofing careers with AI skills (Santandreu Calonge, D. et al.,2025)**

SAMPLE PARTICIPANT RESPONSES

Machine learning

“Books to be delivered, scanned, fetched, collection for availability of the space in the library” classification and catalogues, The assigning of metadata”
STAFF

Generative AI

In my opinion (coming from someone who does not use AI), I feel that AI can be a useful tool in terms of literature, sentence construction, grammar, and building ideas, however, in terms of scientific research, it is not very useful because it does provide inaccurate or false information.

STUDENT

Robots

“Libby, Robot is used to gather client surveys and helps with answering questions.”

Also helps in creating fun for library visitors,

May be regarded as a client service robot

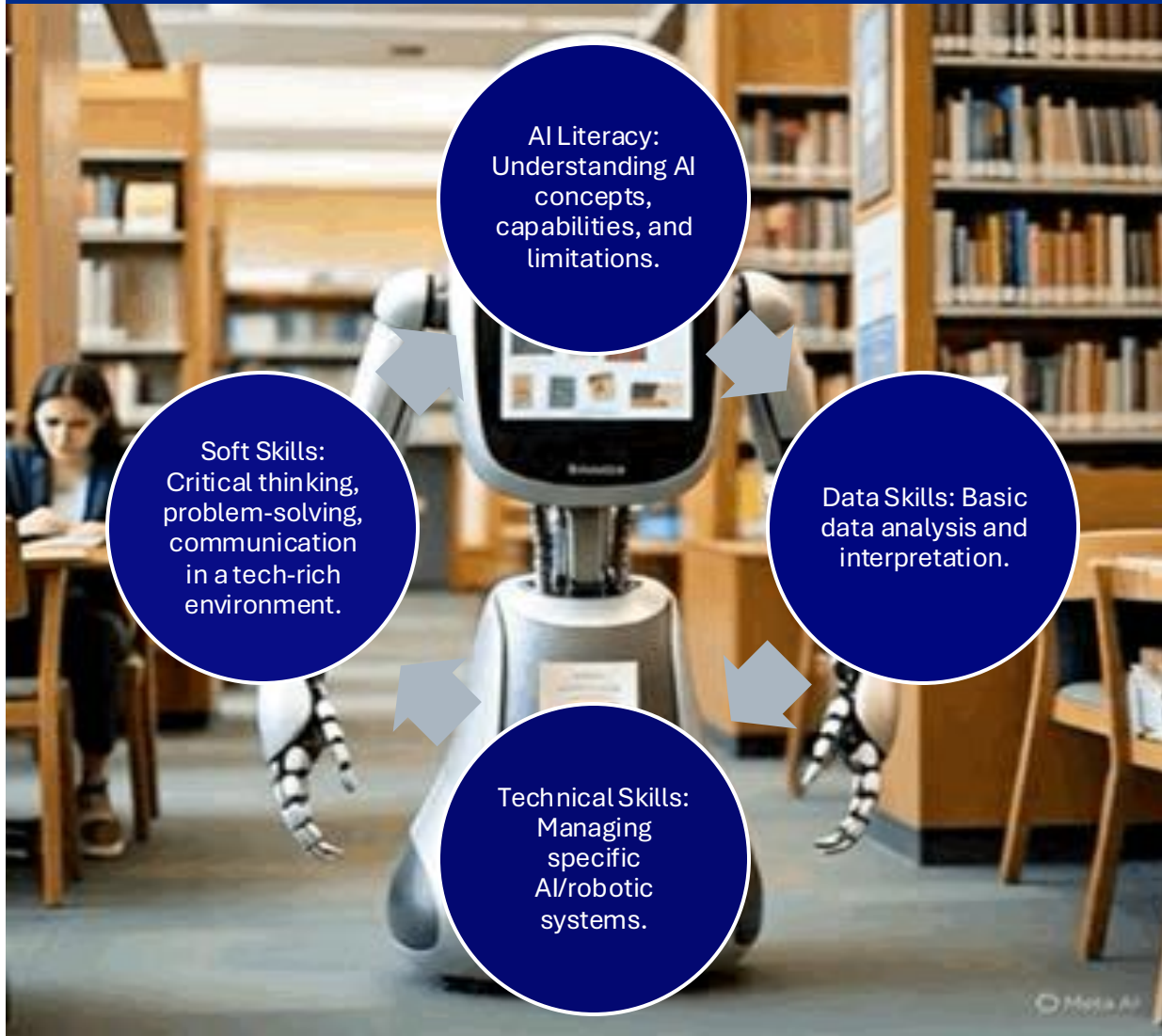
STAFF

AI Usage

Paragraph construction, summaries, explanations, and in terms of statistics, it is a very useful tool when trying to understand code in R studio as well as various mathematical aspects of research.

STUDENT

Our Upskilling Framework: Preparing for the Future



- ✓ **Current staff skills audit digital literacy tool**
- ✓ **New Role Development: Intensifying and creating roles such as UX Librarians, AI System Analysts, Data Analysts, and Digital Technology Analysts.**
- ✓ **Collaboration & Knowledge Sharing: Internal workshops, peer learning, communities of practice.**

MODEL BREAKDOWN

DEFINES THE SCOPE
Created for the study

UP Library's Upskilling model

**Shifting
Researcher
Expectations**

Digital-first

- Digital Literacy
- AI chatbots, AI agents
- Libby (24/7 access), IoT-enabled self-service

Personalised

- Machine learning (user behavior analytics),
- NLP-driven recommendations.
- **SDG's**

Immediate

- Robotics (Libby for quick queries), automated metadata generation,
- **LLM's**

**Key Enablers
(AI, Robotics,
DT)**

AI

Personalized research support,
• AI literacy.

Robotics

- Libby → Bridging digital and Physical service gaps.

Digital Transformation

- Cloud systems → Scalable infrastructure
- Maker Space

**Efficiency &
Engagement**

**Exponential
Data Growth**
Big data

Challenges

Information overload
Skills
Cost

Solution:

AI-powered data curation (advanced algorithms), predictive analytics for resource allocation. Autonomous capabilities

Deeper Engagement

- Virtual agents (research tutorials),
- AI-driven workshops (upskilling).

Efficiency

- Robotics (Libby for quick queries), Autonomous
- Automated metadata generation, Digby App
- (Repetitive tasks), chatbots (FAQs).

IDENTIFY A ROLE BASED SKILLING FOR DIGITAL LITERACY

Skill Area	Beginner	Intermediate	Advanced
✓ AI Literacy	✓ Understand basic AI/machine-learning concepts• Recognize common AI applications (e.g. chatbots) in libraries	✓ Explain AI capabilities vs. limitations to users• Stay current on popular tools (LLMs, search assistants)	✓ Evaluate new AI tools for library use• Advocate ethical AI use and address bias
✓ Data Skills	✓ Basic data/usage stats interpretation• Use simple charts (e.g. Excel pivot) to inform reference trends	✓ Clean and interpret data (e.g. patron queries, circulation stats)• Create visualizations (dashboards or graphs) to support decisions	✓ Apply predictive analysis (e.g. anticipating reference demand)• Lead data-driven evaluation of services
✓ Technical	✓ Use AI-driven search tools (e.g. Semantic Scholar) for research assistance• Assist with simple chatbot configuration/content updates	✓ Configure or “train” virtual reference chatbots (e.g. Dialogflow) with FAQs• Troubleshoot bot responses	✓ Participate in developing AI reference systems (e.g. refining NLP models)• Guide integration of new AI services (e.g. campus-wide AI Q&A)
✓ AI Tools	✓ Utilize basic AI tools (ChatGPT, Google Bard, Elicit) for reference queries• Show patrons how to use Semantic Scholar effectively	✓ Curate and refine AI-generated research answers (improve prompts)• Use literature-review tools (Elicit, Research Rabbit) to speed searches	✓ Innovate with AI tools (e.g. develop specialized prompt banks)• Teach workshops on AI research tools (Semantic Scholar, etc.)
✓ Soft Skills	✓ Communicate tech concepts clearly to patrons• Apply critical thinking to vet AI-provided information	✓ Encourage critical evaluation of AI outputs (spotting errors/bias)• Collaborate with colleagues on AI-led projects	✓ Lead in problem-solving around AI challenges• Advocate for user-centered AI solutions and digital literacy strategies

LEARNING PLATFORMS- COURSES, WORKSHOPS, CONFERENCES, COP

Platform	Advantages	Disadvantages
Coursera	<ul style="list-style-type: none"> ✓ Vast catalog of AI/data courses, from basic to advanced.- AI for Everyone (Andrew Ng) covers AI fundamentals for non-technical learners.- Many courses free to audit; industry-recognized certificates available. 	<ul style="list-style-type: none"> ✓ Mostly general (not library-specific).- Assignments and coding can be challenging for pure librarianship backgrounds.
edX	<ul style="list-style-type: none"> ✓ University-level courses (often free audit).- “Library Carpentry” courses introduce data and ML skills tailored to libraries.- Flexible pace. 	<ul style="list-style-type: none"> ✓ Can be technical (e.g. programming) at higher levels.- Less focus on library contexts.
LinkedIn Learning	<ul style="list-style-type: none"> ✓ 16,000+ courses on tech and soft skills; content kept up-to-date (60+ added weekly).- Accessible via institutional subscriptions.- Includes tutorials on AI tools and data analysis. 	<ul style="list-style-type: none"> ✓ Subscription required (often via institution).- Content is broad/general, few library-specific courses.
Library Juice Academy	<ul style="list-style-type: none"> ✓ Courses designed for librarians, covering AI in libraries (e.g. “AI and Libraries: For Skeptics”, “AI for Library Instruction”).- Instructors are librarians with LIS focus; course content directly relevant to library work. 	<ul style="list-style-type: none"> ✓ Limited course selection; fixed schedule (few times a year).- Cost per course (typically ~\$250 each).

Agentic AI course content for Intermediate (Sample)

Platform (Developer)	Type/License	Integration	Example Use (Institutions)	Key Notes
✓ OpenAI GPT-4 / ChatGPT (OpenAI)	✓ Commercial API (cloud)	✓ Custom via API (web, chat widget, voice)	✓ University catalogs (via API), custom bots	✓ Very powerful NLP; can be embedded in catalogs (e.g. Koha); requires prompt engineering and accuracy checks. Hallucinations are a known limitation.
✓ Amazon Lex / Alexa Skills (Amazon)	✓ Free / Commercial	✓ AWS services; supports voice (Alexa) and text	✓ Library Alexa skills (few universities)	✓ Lex can build voice/text bots; Alexa Skills allow voice Q&A. Libraries can create custom “Skills” (e.g. University of Pretoria Library’s Libby uses Alexa skill). Integration needs AWS development. Voice adds accessibility. Limited by Alexa’s platform policies and user adoption.
✓ Springshare LibAnswers Chatbot	✓ Commercial (SaaS)	✓ Integrates with LibGuides, LibCal, FAQ datasets	✓ Used by many libraries (part of Springshare suite)	✓ Q&A/FAQ chatbot from Springshare. Can use uploaded FAQs/LibGuides content. Not generative (rule-based). Strength: tailored to library data. Limitation: not an LLM; limited conversational ability.

CHALLENGES AND OPPORTUNITIES

- **Challenges:**

- ✓ Resistance to change among staff.
- ✓ High costs of implementing new technologies.
- ✓ Ensuring equitable access to digital tools.
- ✓ Quality and Accuracy of information
- ✓ Data Privacy, Muhammad Yousuf Ali (2023)
- ✓ Digital Divide
- ✓ Ethical Issues
- ✓ Bias and Errors of information, Frank Boateng (2025)
- ✓ Plagiarism and Originality
- ✓ Authorship
- ✓ Over-reliance, Mohammad Hosseini & Kristi Holmes (2023)

- **Opportunities:**

- ✓ Leveraging partnerships with tech companies.
- ✓ Building interdisciplinary collaborations.
- ✓ Creating scalable upskilling programs, Leo S. Lo (2024), Sarah Nakaziba & Patrick Ngulube (2024)



- ✓ Costs
- ✓ Maintenance and Updates
- ✓ User Adaptation
- ✓ Ethical Concerns
- ✓ Availability of data to enhance the model

Key Findings – AI in Practice at UP Library

- ✓ Saves time in document review and improves information accessibility.
 - ✓ NLP identifies appropriate Dewey Decimal or Library of Congress Subject Headings based on content.
 - ✓ Enhancing subject access and resource discovery.
 - ✓ Route incoming student emails or queries to the appropriate departments using intent detection.
 - ✓ Classification of priority emails
 - ✓ IoT integrated into library systems (e.g., self-checkout and submission machines) and a mobile-based RFID app.
 - ✓ Libby was used for basic services, surveys, and engagement
 - ✓ AI aids in cataloguing, classification, and metadata generation
- ✓ To enhance efficiency in creating accurate bibliographic and MARC records using NLP and machine learning.
 - ✓ NLP is used in chat services and digital resources
 - ✓ Use: Automatically extract subject headings, summaries, and classification terms from text.
 - ✓ Improves keyword matching with semantic search, auto-correct, and autocomplete suggestions.
 - ✓ Research support, collection assessment, and thematic analysis of literature.
 - ✓ Extract key themes, entities, or sentiments from academic papers or user reviews.
 - ✓ Research support, collection assessment, and thematic analysis of literature.
 - ✓ Generates summaries of long documents, abstracts, or reports for researchers and librarians.

CONCLUSION

- ✓ AI, robotics, and digital transformation are reshaping research support at the University of Pretoria Library.
- ✓ While challenges such as cost, resistance to change, and ethical concerns exist, significant opportunities exist to enhance efficiency, improve digital literacy, and Upskill staff and students.
- ✓ By leveraging partnerships, fostering interdisciplinary collaborations, and continuously evolving, the library can remain a leader in research support innovation.

REFERENCES

Asemi, A., Ko, A. and Nowkarizi, M. (2021) “Intelligent libraries: a review on expert systems, artificial intelligence, and robot,” *Library Hi Tech*, 39(2), pp. 412–434. Available at: <https://doi.org/10.1108/LHT-02-2020-0038>.

Alshammari, R.F.N. et al. (2022) “Robotics Utilization in Automatic Vision-Based Assessment Systems From Artificial Intelligence Perspective: A Systematic Review,” *IEEE Access*, 10. Available at: <https://doi.org/10.1109/ACCESS.2022.3188264>.

Warraich, N.F. and Rorissa, A. (2020) “Application of linked data technologies in libraries: Pakistani information professionals’ attitudes and perceptions,” *The Electronic Library*, 38(5-6), pp. 1035–1051. Available at: <https://doi.org/10.1108/EL-01-2020-0002>.

Yoon, J., Andrews, J.E. and Ward, H.L. (2022) “Perceptions on adopting artificial intelligence and related technologies in libraries: public and academic librarians in North America,” *Library Hi Tech*, 40(6), pp. 1893–1915. Available at: <https://doi.org/10.1108/LHT-07-2021-0229>.

**“READY TO COLLABORATE WITH ANYONE
ON SIMILAR WORK”
Let us connect**



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

THANK YOU



IFLA Special Interest Group
Artificial Intelligence



UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI