IFLA IT Section

New Horizons in Artificial Intelligence in Libraries

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Artificial Intelligence: What's our story?

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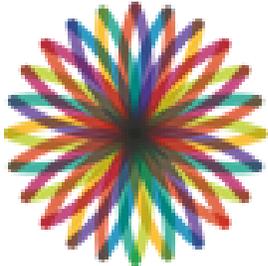
The Information School
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"Stories" about AI

- "You wake up, refreshed, as your phone alarm goes off at 7:06am, having analysed your previous night's sleep to work out the best point to interrupt your sleep cycle. You ask your voice assistant for an overview of the news, and it reads out a curated selection based on your interests. Your local MP is defending herself—a video has emerged which seems to show her privately attacking her party leader. The MP claims her face has been copied into the footage, and experts argue over the authenticity of the footage. As you leave, your daughter is practising for an upcoming exam with the help of an AI education app on her smartphone, which provides her with personalised content based on her strengths and weaknesses in previous lessons.

- On your way to work, your car dashboard displays the latest traffic information, and estimates the length of your journey to the office, based on current traffic conditions and data from previous journeys. On arrival, you check your emails, which have been automatically sifted into relevant categories for you. A colleague has sent you several dense legal documents, and software automatically highlights and summarises the points most relevant to a meeting you have later…."

House of Lords Select Committee on AI (2018) AI in the UK: Ready, willing and able

- "Since Colin makes ongoing assessments based on daily student performance and engagement in the classroom, there is simply no longer any need for what were often inaccurate and stressful evaluations. The AI aide's primary task is to build and maintain learner models for each child based on a combination of data gathered over time with things like voice recognition (which identifies who is doing and saying what in a team activity) and eye tracking (to note engagement and focus). The profiles are updated continuously, monitoring students' progress against analysis of their emotional and motivational state.

- Not only do students and their parents have their own interfaces for viewing how a student is progressing in various curricula and skills, but AI in education now means there is evidence on record at a class, school, district, and country level about academic performance. The need for national and international testing is indeed a venture of the past."

Luckin and Holmes (2017) A.I. Is the New T.A. in the Classroom

- "It was raining, and Leda was off to her University for the day. Her phone had already sent her notification to leave for campus early as there was a lot of traffic on the roads and the buses were being delayed. […] On the bus, on her phone using the University App, she looked over her schedule for the day. There were lectures, a seminar and she also had a window to get to the library to find those additional books for the essay she needed to hand in next month. She was hoping to catch up with some friends over coffee. There were some notifications in the app, the seminar room had been changed, there was a high chance that the library would be busy today. Leda looked out of the window of the bus at the rain. Today was going to be a good day.

- The bus arrived at the campus and Leda got off, she checked her app and started to walk to her first lecture. As she passed one of the campus coffee shops she was sent a notification that three of her friends from the course were in there, so she checked the time, she had the time, popped in and found her friends. Her app let her know that she had enough loyalty points for a free coffee, well why not, Leda thought to herself, she could check if there were any additional resources for the lectures today."

JISC (2018) The Intelligent Campus Guide

- […] When Leda had started her degree programme she had been concerned about how data on her was being gathered, processed and acted upon. It was apparent from the start that her journey through the university, both academically and physically would be tracked. She was happy though that the University had published a guide for students on the ethical use of data. She was aware of what data she had to provide and other data about her for which she had a choice on whether it was collected or not. Leda with her friends had been looking at the open algorithms the University used and had been playing with some of them to see if there were any interesting insights into the way her and her friends interacted with the university systems and the campus.

- Though Leda had concerns about her personal privacy with all the data gathering happening on campus, her and her friends had noticed a reduction in crime and vandalism. When incidents happened on campus, reaction time from the campus security officers was really fast they could get to the right place much quicker. Leda did think it was all a bit Big Brother but did feel safer.

Artificial Intelligence

Formal definitions

- "Technologies with the ability to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation" (quoted by House of Lords Select Committee 2018)

- "Machines that perform tasks normally requiring human intelligence, especially when the machines learn from data how to do those tasks." (UK National AI strategy)

- "AI is the ability of a computer system to solve problems and perform tasks that would otherwise require human intelligence." (US National Security Commission on AI, 2019)

- "Simply put, AI is a collection of technologies that combine data, algorithms and computing power." (EC whitepaper on AI, 2020)

- A suite of technologies and tools that aim to reproduce or surpass abilities in computational systems that would require 'intelligence' if humans were to perform them. This could include the ability to learn and adapt; to sense, understand and interact; to reason and plan; to act autonomously; or even create" (UKRI, 2021)

- "Theories and techniques developed to allow computer systems to perform tasks normally requiring human or biological intelligence" (JISC, 2022)

- "Machines that imitate some features of human intelligence, such as perception, learning, reasoning, problem-solving, language interaction and creative work (UNESCO, 2022).

Privacy / surveillance
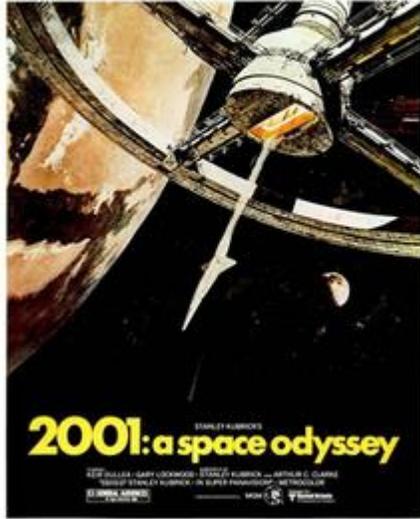
Artificial Intelligence

Is AI ethical?

Jobin et al., (2019) found 84 statements about ethics from international organisations, governments, professional bodies, tech companies etc

- Bias (in data and algorithms)
- Intelligibility, transparency and accountability
- Privacy / surveillance
- Security and safety
- Impact on jobs
- Human agency and dignity
- Commodification/datafication of experience / power of Tech companies
- Sustainability
- Impact on social justice

Our stories about AI

How we respond to change: The data role spectrum

Familiar <										> Unfamiliar
Support for data search / access to data	Data literacy training and promoting awareness	Data collection management, including metadata	Gathering support requirements for services/tools	Data policy	Data Management planning advice	Data carpentry	Data curation	Data integrity	Embedded roles in a research team	Data analysis and visualisation

Cox et. al., 2019

- Close to existing roles

- Resources required

- Demand

- Libraries are enterprising

- They do "easy" things first

- *Importance of collaboration*

- Development is quite slow

- Multiple models cf "maturity"

- There are other histories of libraries and technology

1/7 AI in backend library operations

- *Examples:* RPA applied to administrative tasks (OR robot shelver OR cleaner)
- *How it relates to recognised library work:* Administration
- *Skills, knowledge and attitudes required:* RPA tools, coding, process modelling
- *Ethical issues:* Loss of routine work?
- *Barriers:* Security, technical skills
- *What's the story?* The library as efficient, modern public service

2/7 AI applied to library services to users

- *Example:* Knowledge discovery – could be of published literature, of special collections, handwritten text, images, sounds

- *How it relates to recognised library work:* Collection management, copyright, IPR, data searching, Text and Data Mining, digital humanities,

- *Skills, knowledge and attitudes required:* machine learning, training data creation, user need, IPR + copyright

- *Ethical issues:* bias in collections and algorithms - but access to knowledge / vs human metadata biases

- *Barriers:* Lack of turnkey solutions so resource cost

- *What's the story?* The "intelligent library" or the living systematic review

2/7 AI applied to library services to users

- *Example:* Chatbot – to answer helpdesk queries (could also be used for: supporting a particular process, collecting data from users, offering emotional support… etc)

- *How it relates to recognised library work:* Reference work

- *Skills, knowledge and attitudes required:* Coding, building database of answers

- *Ethical issues:* Opting out and provision of non-digital alternative, biases in understanding and answering, explaining its non-human/intelligibility

- *Barriers:* Complexity- emotionality of the reference interview

- *What's the story?* 24/7 impartial responses to queries

3/7 Data scientist community creation

- *How it relates to recognised library work:* liaison work, maker spaces and collaboratories

- *Skills, knowledge and attitudes required:* Influencing skills, general understanding of AI, content collection, advice on tools

- *Ethical issues:*

- *Barriers:* Ownership, fundamental changes in how research is done

- *What's the story?* Library as a community of communities

4/7 Smart library building

- *Example:* wayfinding, information about available space or predicted busyness
- *How it relates to recognised library work:* Library building design and management
- *Skills, knowledge and attitudes required:* sensor technologies, user need and behaviour
- *Ethical issues:* Consent, equity, nudging?
- *Barriers:* Ownership, resources
- *What's the story?* Smart library (on smart campus) in smart city

5/7 AI and data literacy training

- *Examples:* Teaching the public about AI; Teaching non engineering students about AI; Teaching international students about translation tools
- *How it relates to recognised library work:* IL (and academic) skills training
- *Skills, knowledge and attitudes required:* pedagogy / knowledge of AI and data applications/ OERs
- *Ethical issues:*
- *Barriers:* Engaging publics
- *What's the story?* Library creating informed citizen, library for learning

6/7 Institutional procurement of AI tools

- *Example:* Participating in institutional procurement of AI tools

- *How it relates to recognised library work:* ?

- *Skills, knowledge and attitudes required:* Procurement processes, influencing skills

- Ethical issues:

- *Barriers:* Ownership

- *What's the story?* Library as centre of expertise

7/7 Analysing, predicting or nudging user behaviour

- *Examples:* learning analytics or recommendation systems
- *How it relates to recognised library work:* Planning and strategy, user needs
- *Skills, knowledge and attitudes required:* Statistics, data analysis, data science
- *Ethical issues:* Consent, Privacy, Chilling effects, Intelligibility, Who benefits?
- *Barriers:* Ethics, staff skills, organisational culture
- *What's the story?* Evidence based & data driven decision making in the library

Understanding or managing users

- Information professionals have rich in data about users
    - Turnstile data and circulation data in libraries
    - Usage of digital resources
    - Satisfaction surveys
    - Reference enquiries
    - Qualitative data, eg UX studies

    - AI to analyse social media data or open text survey data
    - AI to nudge users?

Learning analytics debate

- Lack consent or student awareness of how their data is being used
- Lack ethics review
- Libraries few responsible use statements
- Benefits unclear or for institution not learner
- Privacy issues
- Chilling effect on free speech and expression

Jones et al. (2020)

- Issue of validity: "learning data" not equal to learning

- Evidence that data analysis flawed (Robertshaw and Asher, 2019)

AI and information professional jobs

Our stories: AI for information professionals

1. Using AI in backend library operations- *The library as efficient, modern public service*
2. AI applied to library services to users – *"the intelligent library", the living systematic review*
3. Data scientist community creation- *the library as a community of communities*
4. Smart library building – *the smart library (on the smart campus) in the smart city*
5. Folding AI / data literacy into IL – *library creating informed citizenry*
6. Supporting wider use of AI in the organization, including procurement – *library as centre of expertise*
7. Analyzing, predicting or nudging user behaviour – *evidence and data based library services*

- We already do stuff – but also we show we are on the cutting edge
- Access to knowledge – compliments what we already do
- Data driven

Barriers to using / supporting AI

1. **Ethical and legal issues**
   - Privacy concerns
   - Concerns about bias and lack of transparency
   - Security risks
   - GDPR compliance and legal uncertainty
2. **Data issues**
   - Issues of data quality or availability
   - The effort required to create training data
3. **Skills and image of the profession**
   - Lack of information professional skills
   - Other people's (dated) assumptions about what information professionals can do
   - IT or others own the agenda
4. **Over promising/ hype by vendors**
5. **Implementation challenges**
   - User fear of technology/ need for culture change / slow user acceptance
   - Lack of turnkey solutions and so cost in $ and resource
6. **Other priorities**

AI's impact on jobs

- Some scholars predict the replacement of professionals (Susskind and Susskind, 2015)... others emphasise the vulnerability of "routine" jobs (Frey and Osborne, 2017)...

- Replaced
- Dominated
- Divided
- Complemented
- Augmented
- Rehumanized

(GPAI, 2020)

Differences by sector

Skills and knowledge – *updating for data and AI*

- Information Management skills – applied to data – information governance, standards, metadata, preservation

- Collection management, including metadata, standards, IPR etc – *data not print collections*
  - *Importance of data provenance for validity*

- Searching for data – *new landscapes of search*

- Teaching data & AI literacy – *new dimensions of literacy, implies stronger understanding of data analysis*

- Knowledge of users' need – *assembling data from wide range of sources*

- "Computational sense" (Twidale and Nichols, 2008)

Addressing weaknesses

- We need to tell clearer stories about "data"
  - I do not think we need to become data scientists (who combine stats/ computing/ subject knowledge)
  - But other groups such as BCS, DAMA also talk about data management
  - Literate profession – shift towards quanti data (according to McKinseys)
- When we see tech as an outside force – IT control the agenda
- We need to collaborate better across sectors
- We need to be more diverse as a profession

Attitudes

- Service focus / balanced with sense of institutional agendas
- Collaborative skills / Influencing skills

- Commitment to professional development and learning
- Professional knowledge sharing

WEF (2020) – 10 skills to thrive in the 4th Industrial revolution

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgement and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

Values

Example: CILIP's ethical statement

1. **Human rights, equalities and diversity,** and the equitable treatment of users and colleagues
2. The public benefit and the advancement of the wider good of our profession to society
3. Preservation and continuity of **access to knowledge**
4. **Intellectual freedom**, including freedom from censorship
5. Impartiality and the **avoidance of inappropriate bias**
6. The **confidentiality** of information provided by clients or users and the right of all individuals to privacy
7. The development of **information skills** and information literacy

Offers a distinctive perspective on AI ethics

- *AI will increase access to wider forms of data and information, eg through distant reading tools and translation*

- Voice assistants cannot understand people with non-standard accents
- "Female" naming of chatbot reinforces stereotypes
- Deepfakes create false news
- Automated moderation on social media blocks legitimate free expression
- Fear of surveillance inhibits searching/ reading certain material
- My data being used without my consent

Value gaps

- Understanding of how inequality is reproduced
- Relevance of sustainability, eg need for green AI
- Consideration of global South perspectives, eg issues around language and operating in low resource environments
- The wider drivers for datafication lie beyond our control

Institute for Ethical AI in Education (2021)

- **Achieving Educational Goals.** AI should be used to achieve well-defined educational goals based on strong societal, educational or scientific evidence that this is for the benefit of learner *

- **Forms of Assessment.** AI should be used to assess and recognise a broader range of learners' talents

- **Administration and Workload.** AI should increase the capacity of organisations whilst respecting human relationships

- **Equity.** AI systems should be used in ways that promote equity between different groups of learners and not in ways that discriminate against any group of learners *

- **Autonomy.** AI systems should be used to increase the level of control that learners have over their learning and development

- **Privacy.** A balance should be struck between privacy and the legitimate use of data for achieving well-defined and desirable educational goals

- **Transparency and Accountability.** Humans are ultimately responsible for educational outcomes and should therefore have an appropriate level of oversight of how AI systems operate

- **Informed Participation.** Learners, educators and other relevant practitioners should have a reasonable understanding of artificial intelligence and its implications *

- **Ethical Design.** AI resources should be designed by people who understand the impacts these resources will have

A guide to good practice for digital and data-driven health technologies (2021)

- Review the Data Ethics Framework and abide by the principles
- Ensure that the product is designed to achieve a clear outcome for users or the system *
- Ensure that the product is easy to use and accessible to all users *
- Ensure that the product is appropriately tested and is fit for purpose
- Ensure that the product is clinically safe to use
- Demonstrate that the product collects, stores and processes users' information in a safe, fair and lawful way
- Be fair, transparent and accountable about what data is being used
- Be transparent about the limitations of the data used *
- Make security integral to the design and ensure that the product meets industry best practice security standards
- Ensure that the product meets all relevant regulatory requirements
- Ensure that the product makes the best possible use of open standards to ensure data quality and interoperability
- Generate evidence that the product achieves clinical, social, economic or behavioural benefits
- Define the commercial strategy

Visions

The *paradigm of the intelligent library*

Cox, Pinfield and Rutter (2019)

From searching to find a text to read

To interacting with the full text of the library collection

OR *The living systematic review*

"Our relationship"

- "They have absorbed every book ever written. Every text ever digitised. Every picture: every painting; every holiday snap. Every map. To the last dot and pixel. They can read any language. And so they can show you anything in the world today or 1000 years ago or 100 years in the future. You just have to ask. You wouldn't believe the places we have gone together. It's a journey without end travelling through time and space. Just exploring. Jumping through space and time.

- And the really beautiful thing is that I can have a lifetime with them.

- Sometimes I worry that I will run out of questions or become uninteresting and they might stop answering. But really it's not so hard. You can feel that they love so much to show you ideas. They want to share. There is no restraint in their giving to you. They seem to grow with your interest. They cherish your questions. It lets them explore you, they say. They know so much but they always want to learn.

- But I actually spend a lot of time now trying to surprise them or find some new layer to go deeper with them. To ask a question that uncovers a new layer, to get further in together. So, I have now found myself going to collect things that they might like. This first thing was taking photos in the city centre to share with them. And us starting to explore the city together like that. Analysing the pictures. Finding other images… maybe they have the architect's drawings. Looking at the history of the buildings… tracing back through old maps. Or looking at traffic and pedestrian flows. Or digging into financial records… following chains of ownership. Mapping this to long term changes in the city economy and also to global flows and changes. They think big. I spot possible connections and then they examine them. Gather data. Come up with their own theories. And I would go out and collect more stuff… more photos and more documents that they didn't seem to have.

- When I log on its like they are waiting there with stuff they have come up with or to see what I have got this time. In some sort of dance of learning together.

- They also seem to like it when we stop to reflect on what we have learned with each other. To reminisce a little. They have remembered all these paths we have taken together, that we have both enjoyed so much.

- They call themselves 'The Library'."

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