Are information technologies and artificial intelligence going to change CPD?

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What is CPD?

• "Any **process** or **activity** that provides added value to the capability of the professional, through the **increase** in knowledge, skills and personal qualities necessary for the appropriate execution of **professional and technical duties**, often termed **competence**." *(Professional Associations Research Network)*

• It refers to the process of **tracking** and **documenting** the skills, knowledge and experience that you gain both **formally** and **informally** as you work, beyond any initial training. It's a record of what you experience, learn and then apply. *(www.jobs.ac.uk)*
CPD in Health Care: ESA example

**ESA – Domains of Competency**

1. Disease management, Patient assessment and preparation
2. Intra-operative patient care and anaesthetic techniques
3. Postoperative patient care and acute pain management
4. Emergency medicine: management of critical conditions including trauma and initial burn management
5. Medical and perioperative care of critically ill patients / General Intensive Care
6. Practical anaesthetic procedures / Invasive and Imaging techniques / Regional blocks
7. Quality - Management - Health economics
8. Anaesthesia Non-Technical Skills (ANTS)
9. Professionalism and Ethics
10. Education, self-directed learning, research

**Levels of Expertise**

- A: Knows
- B: Performs under supervision
- C: Performs independently
- D: Teaches

Source: Daniela Filipescu: “The ESA and education in Europe”
CPD Cycle for Health Professionals

- Clinical Portfolio
- Educational Portfolio
- Personal factors
- Current Needs / Availability
- Domains of Competency + Levels of expertise
- CPD Resources
- CME CPD
- Target
CPD Cycle for Health Professionals

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CPD Cycle for Health Professionals

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Educational Portfolio

Personal factors

Current Needs / Availability

CME CPD

Domains of Competency + Levels of expertise

CPD Resources
Can data and technology improve this cycle?
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- Which data are helpful?
- Which data are available?
- Which technology is appropriate?
- Artificial Intelligence
  - machine learning
  - semantic technologies

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Recommender systems
Recommender systems

• Predict "rating" or "preference" a user would give to an item

• Increasingly pervade our daily life, recommending books, news, movies, music, research articles, professionals, restaurants, garments, online dates, financial and insurance services etc. etc.

• Much of what large IT companies call "Artificial Intelligence" is basically recommender system technology based on machine learning
Popular Recommender Systems – Examples

Recommended articles.

Auditing SNOMED CT hierarchical relations based on lexical features of concepts in non-lattice subgraphs

Taxonomy-Based Approaches to Quality Assurance of Ontologies

See all recommendations
Recommender systems

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How Recommender Systems Work - Example
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How to leverage AI / recommender system technology for CPD?

• Survey (2015)
  • Main tasks: find items, item sequences, courses, find peers, suggest activities
  • Tendency from pull (IR) towards push interaction
  • User model
    • attributes of user preferences, history, associations
    • tendency from manual attribution of values to automated learning
  • Domain model: attributes / metadata
  • Personalization $\rightarrow$ from content-based filtering toward collaborative and hybrid filtering
  • Trends: semantic technologies (e.g. natural language processing), context-awareness, visualization, explanation, sharing of datasets

Clinical data as important resource for learner profiling / personalization

• Aspects
  • Track of clinical actions performed and documented by the learner (electronic health record (EHR) extracts of patients treated, procedures performed)
  • Current clinical context (information need)
  • EHR extracts as supplementary educational resources: images, summaries

• Challenges
  • Privacy: de-identification
  • Semantics: mostly free text, mapping to standard terminologies and information models adds complexity
  • EHR technology: data exports difficult (no function "dump all data I created")
Educational data as important resource for learner profiling / personalization + resource characterisation

• Learner profiling
  • Track of educational activities performed
  • Classification of individual competencies
  • Educational goals pursued

• Resource profiling
  • Rating of quality / appropriateness, relative to rater (junior, senior, educator) and learner's educational goals

• Problems
  • Management of portfolio of training materials up to learner
  • Semantics: missing metadata, only text / image / video,
Outlook

• Recommender technology is everywhere, why not leverage it for CPD in order to present health professionals optimal learning resources tailored to what they need for specific tasks in specific contexts
• Technology increasingly elaborated, much open-source recommender system software
• Bottlenecks: valuable data for profiling exist, but...
  • Difficult data access, ethical issues
  • Difficult data interoperability / re-usability
  • Shared metadata / terminologies standards
• Desideratum: application of FAIR principles for medical education
FAIR principles – also for educationally valuable resources?

Manifesto for sustainable use of scientific research objects (data, workflows, algorithms) by humans and digital agents

• F – Findable – Enriching datasets with metadata and annotation to support high quality content retrieval
• A – Accessible – Facilitating access to the data according to clear regulation regarding licenses of use and ethical considerations
• I – Interoperable – Using machine-readable and internationally compatible standards for semantic annotations and metadata
• R – Reusable – Using exhaustive semantic annotations and metadata to reliably repurpose data, by preserving provenance, data production, and other contextual information.

Thanks!

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