New Horizons for Learning Analytics in the Age of AI

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Learning analytics

Using data to understand and optimize learning and environments
Learning analytics are about learning

Learning analytics

Where education, design, and data science meet
Critical dimensions of learning analytics

Learning analytics

Learning analytics empower learners and educators
Learning analytics

Promising results and high interest
Prediction and description of outcomes and processes
Learning strategies and 21\textsuperscript{st} century skills
Adaptive learning support and personalized feedback at scale
Topics in learning analytics 4/4

Ethics, privacy, and policy
Challenge

Data are not purposefully collected to understand and optimize learning

Implications for measurement validity and actionable insights
Challenge

Ineffective forms of interaction with AI in learning analytics

Implication for impact of learning analytics
MEASUREMENT – INTERACTION – FINAL REMARKS
Challenges

Validity – Progression
Validity

Do counts of clicks count for learning?
Does increase in number of clicks mean learning progression?

Strategies for validity and progression tracking

Focusing on constructs that matter

Using existing data
AI to automate coding of discourse

Established coding schemes (deductive coding)
AI to automate coding of discourse

Unsupervised approaches (inductive coding)

AI to automate coding of discourse

Explains the properties of constructs measured

AI to automate coding of discourse

Coding in multiple languages

Tracking progression

Strategies for improving validity and insight

Focusing on constructs that matter

Using novel forms of data collection
Novel forms of data collection
Strategies for improving validity and insight

Raw trace data

Learning actions

SRL processes

SRL process model

Multi data channels:
Navigation log
Peripheral data
Eye-tracking data

Actions such as:
Relevant_reading
Write_essay
Note_editing

Mapping with SRL theory:
Process 1 -> Orientation
Process 2 -> Monitoring
Process 3 -> Evaluation

Process 1 -> Action 1 -> Action 2
Process 2 -> Action 2 -> Action 3
Process 3 -> Action 4 -> Action 2 -> Action 3
Process N -> Action N

Orientation
Planning
Elaboration
Evaluation
Monitoring

Modelling methods such as:
Process mining

AI for identifying and analyzing higher order constructs
Theory-driven use of Ai is great, but is it usable?

Translating constructs to the language clear to end-users
Theory-driven use of Ai is great, but is it usable?

Role of human-centred design
Interaction

Dashboards can be harmful
Interaction

Dashboards can be harmful

Interaction

Design of current dashboards is not robust

Interaction

Current dashboards are not interpretable

Direction

Abandoning preconceived design decisions

Don’t show what is easy to be visualized
Model of user-centered learning analytics systems

- Detailed reporting of studies conducted is essential for contributions to research knowledge.
- Evaluation studies need to be informed by and inform theory.
- Design-based research with several iterations of design-evaluation is important.
- Theory-informed instrumentation and data evaluation is necessary to understand the process.
- Presentation of social references does not constitute feedback by default.
- Focus should be on process and regulation levels of feedback.
- Dashboard should promote the dialogic nature of feedback.
- Learning analytics dashboards can suffer from the similar challenges as document for feedback.

Theory
- Showing existing and recommending changes in learning tactics and strategies is critical.
- Incorporation of knowledge of tasks is essential to offer suitable recommendations.
- Consideration of indicators of standards and evaluation learners use is needed to make impact.
- Goal setting needs to be supported by suitable instrumentation to measure learning progression.
- Design decisions should be informed by theory.
- Design of dashboards is not about what is easy to show (e.g., primitive operations).
- User preferences may not reflect what is the most effective way to learn.
- Generalisations about the single most optimal data representation must not be made.

AI to identify constructs that matter

Automated detection of learning and time management strategies

AI to identify constructs that matter

Explainable learning strategies that predict learning success

AI to measure impact of feedback

Effects on learning strategies, time management, and self-regulated learning

Directions

Automated feedback analysis and generation

Content knowledge
Pedagogical knowledge
AI
AI to enhance feedback quality

Automatic detection of use of good feedback practices

AI to enhance feedback quality

Automatic detection of what types of feedback are used

AI to enhance feedback quality

Automatic detection of the ways how feedback is communicated

AI to generate feedback from data

Research in data-to-text and natural text generation
MEASUREMENT – INTERACTION – FINAL REMARKS
Learning analytics

AI offers much potential to advance learning analytics, but...
We must not forget

Where education, design, and data science meet
We must not forget

Learning analytics is about (human) learning
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