Implementing Learning Analytics & AI in Education

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Professor, Department of Information Science & Media Studies
Director, Centre for the Science of Learning & Technology

http://slate.uib.no
Online Education Symposium, Japan, April 2024
Faculty of Fine Art, Music and Design
Faculty of Humanities
Faculty of Law
Faculty of Medicine
Faculty of Mathematics and Natural Sciences
Faculty of Psychology
Faculty of Social Sciences
University Museum of Bergen
Through interdisciplinary research SLATE investigates the technological, pedagogical, interpretive, cultural, ethical, and legal aspects of learning analytics (LA) and artificial intelligence in education (AIEd), and promotes the responsible use of technology in education.

Visit us: http://slate.uib.no
Annual Report 2023

SLATE

2023 in numbers

- Journal articles: 28
- Blog posts & Chronicles: 8
- Conference papers: 6
- Book chapters: 4
- Conference posters: 4
- PhD dissertations: 4
- Conference abstracts: 4
- Reports: 4
- Workshop papers: 2
- Doctoral theses: 2
- Masters theses: 1
- Special issue: 1

We worked on 35 projects
We held 73 presentations
We hosted 5 guest lectures
We spoke on 2 podcasts

We organized 23 events:
- 8 workshops
- 10 courses
- 2 symposia
- 2 webinars
- 1 UiB AI seminar

SLATE collaborators across the globe in 2023
45 unique institutions/organisations across 29 countries

Academia (70%)
Public sector (17.5%)
Private sector (12.5%)
AGENDA

➤ DigiTrans: LA of LMS Use at UiB
➤ Norwegian Expert Commission on Learning Analytics
➤ Council of Europe Expert Group on AI and Education
➤ Next steps for Implementing LA & AI
DIGITRANS: UIB TRANSFORMATION

A. Organisation, Leadership & Innovation
B. Adaptation to Online Teaching & Learning
C. Learning Design in Online Courses
D. Digital Student Behaviour
DIGITRANS: UIB TRANSFORMATION

C. Learning Design in Online Courses

How courses are structured in Canvas in H19, H20, H21?

COURSE SELECTION

- Bachelor program descriptions on uib.no
- 3rd semester
- 10-15 ECTS
- Fall: H19, H20, H21 in LMS Canvas
COURSE SELECTION

106 courses

Fig. 1. Distribution of courses by faculty and ECTS credits

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CANVAS COURSES

features in a Canvas course

Administration
Announcement, People, Grades
mean H19 = 1.75
mean H20 = 2.79

Content
Files, Syllabus, Pages, Modules, Videos
mean H19 = 2.94
mean H20 = 3.8

Activities
Discussions, Quizzes, Assignments
mean H19 = 1.01
mean H20 = 1.23
IMPLEMENTATION RATES: H19, H20, H21 ALL COURSES

(*over 60% of courses implemented the feature)

TABLE 4 Implementation rates of features per semester.

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<tr>
<th>Feature type</th>
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*Increased all 3 years*
### IMPLEMENTATION RATES: H19, H20, H21 FEATURES - PER FACULTY

Increase all three years

significant increases H19 -> H20

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<th>Features</th>
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CHANGES DUE TO THE PANDEMIC

- Increased availability of tools (nationally & locally) to support hybrid/online teaching & learning
  - Zoom (Nordic installation), Teams, Kaltura, video streaming solutions

- More hybrid teaching solutions

- More support mechanisms for teaching staff (technical & pedagogical)

- Getting the data for learning analytics is difficult, if not impossible (e.g., no Zoom, Teams or Kaltura data)
Ekspertgruppen for digital læringssanalyse
Ekspertgruppen for digital læringanalyse


Gruppen overleverte sin første delrapport 1. juni 2022. Denne rediger for hva læringanalyse er, og hvilke implikasjoner det kan ha for norsk utdanning i dag og i nær framtid. For å belyse disse spørsmålene har ekspertgruppen løftet fram fire dilemmor, som synliggjør hvor det er behov for mer kunnskap, bevissthet og refleksjon. Les mer om rapporten under menyvalget ”Delrapporten”.
MANDATE

The expert group shall provide the Ministry of Education with a better basis for decisions about learning analytics and adaptive teaching and assessment tools in basic education, higher education and higher vocational education, and advise on the need for regulation and input for policy development and measures from the Ministry of Education and underlying agencies (e.g., Directorates).
# Expert Commission

Marte Blikstad-Balas, **Professor**  
Department for Teacher Education and School Research,  
**University of Oslo (task force leader)**

Monica Andreassen, **Teacher**  
Science & mathematics, **Langnes skole, Tromsø**

Einar Duenger Bøhn, **Professor**  
Department of Religion, Philosophy and History, **University of Agder**

Ann-Tove Eriksen, **Dept. Director**  
**Directorate for Higher Education & Competence**

Michail Giannakos, **Professor**  
Department of Computer Science, **NTNU**

Hedda Huse, **Dept. Director**  
**Directorate for Education and Training**

Malcolm Langford, **Professor & Director**  
Department of Public and International Law, **University of Oslo & Director, Centre for Experiential Legal Learning (CELL)**

Eirin Oda Lauvset, **Lawyer**  
Data Protection Officer, **Asker Municipality**

Per Henning Uppstad, **Professor**  
Norwegian Centre for Reading Education and Research (national centre),  
**University of Stavanger**

Barbara Wasson, **Professor & Director**  
Department of Information Science & Media Studies, **University of Bergen & Director, Centre for the Science of Learning & Technology (national centre)**

*Ministry of Education, Secretariat: Hilde Hultin, Jon Lanestedt, Øystein Flø Baste*
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<tr>
<td>Pupil &amp; Student organisations</td>
<td>Elevorganisasjonen, Norsk studentorganisasjon, Organisasjon for Norske Fagskolestudenter</td>
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<td>Asker, Lillestrøm, Lørenskog, Oslo, Surnadal (IKT-ORKidé-samarbeidet), Voss, Møre og Romsdal, Vestfold og Telemark, Vestland og KS</td>
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<td>BS Undervisning, Cappelen Damm, Cyberbook, Conexus, Disputas, Fagbokforlaget, Gyldendal, Hypatia, Kikora, LearnLab og IKT-Norge</td>
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<tr>
<td>Legal group</td>
<td>Jon Christian Fløyevik Nordrum, Mona Naomi Lintvedt, Sebastian Schwemer, Emily Weitzenboeck, Malgorzata Cyendecka og Trude Haugli</td>
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<tr>
<td>Others</td>
<td>Sametinget</td>
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Learning Analytics - Some Central Dilemmas
Midway Report

1 June 2022

https://laringsanalyse.no/
FOUR DILEMMAS

Dilemma 1: The need for information vs The need for data protection

Dilemma 2: Learning as an Individualised process vs Social process

Dilemma 3: Centralisation vs Autonomy

Dilemma 4: Competence Needs vs Competence Reality
LEARNING ANALYTICS – SOME CENTRAL DILEMMAS

Legal Issues (17 pages!)

1. Anonymised data and personal information
2. Legal basis for processing personal data
3. The Constitution and the European Convention on Human Rights the convention (ECHR)
4. The Personal Data Protection Regulation and the main legal basis
5. The Personal Data Protection Regulation and other legal bases
6. Special categories of personal data and secondary use
7. Reuse of personal data for new purposes
8. Minimising risk
9. Built-in privacy protection
10. Development of certification and behavioural norms
11. Assessment of privacy consequences and reduction of high risk
12. Data subjects' rights and participation
13. Processing and storage of personal data in third countries
14. Regulation of individual automated decisions
15. The Procurement Act and the purchase of digital resources
Learning, where did you go in all the hustle and bustle?
Use of pupil and student data to promote learning

NOU (Norwegian Public Report)

6 June 2023

Pedagogical
Legal
Ethical
Infrastructure & Support
Competence needs
COUNCIL OF EUROPE EXPERT GROUP

AI AND EDUCATION

A thorough and critical overview of the use of artificial intelligence in education

HUMAN RIGHTS
DEMOCRACY
RULE OF LAW

Wayne Holmes,
Jen Persson,
Irene-Angelica Chounta,
Barbara Wasson &
Vania Dimitrova (2022)

https://rm.coe.int/artificial-intelligence-and-education-a-critical-view-through-the-lens/1680a886bd
Learning with AI

Learning about AI (Literacy)

Preparing for AI (Literacy)

Using AI to learn about learning

Learning Analytics

AI literacy: technology dimension

AI literacy: social dimension
Some **challenges** for AI and education

- Almost all current commercial student-supporting AI tools:
  - **undermine student agency** (and can amount to surveillance)
  - **dismantle teachers** (and parents)
  - **automate poor pedagogic practices**
    (e.g. instructionism and e-proctoring exams)
  - **do not ‘save teacher time’ nor ‘personalise learning’**
  - **have little evidence** for their efficacy
The State of Artificial Intelligence and Education Across Europe:
The results of A Survey of Council of Europe Member States

Irene-Angelica Chounta, Vania Dimitrova, Paulo Nuno Vicente, Malgorzata Cyndecka, Wayne Holmes, Lidija Kralj, Jen Persson, Barbara Wasson
Council of Europe, AI&ED Expert Group

PRE-CHATGPT
Adaptative, collaborative, language learning and learning analytics tend to be the most common AI systems used in educational contexts.

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<tr>
<td>Learning Analytics</td>
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<td>Collaborative learning environments</td>
<td>11</td>
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<td>Plagiarism checking systems</td>
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n=25
FORESIGHT FOR TOMORROW

Concerning: policy implementation and strategy on teaching and learning about AI

Does your ministry or other national/state body have a specific policy/strategy on teaching/learning about AI technologies?
(23 responses)

- Yes: 5
- No: 8
- Don't know: 3
- Other, please specify: 7

Is there a specific budget allocated to the development, implementation and monitoring of this policy/strategy?
(22 responses)

- Yes: 9
- No: 3
- Don't know: 10

Member states are working to some extent on AI teaching and learning policies, but without a specific budget dedicated to their development.
Data policies are the most common governance mechanism for the use of AI in education contexts.
CONCLUSION

AI&ED policies need to take into account the fundamental values of the Council of Europe.

01 AI policies and strategies specific to education sector
Most member states have established general policies and strategies for the use of AI or are in the process of doing so. However, AI and education is not addressed as a special or distinct case, due to the absence of specific policies.

02 Monitoring and regulation particularly in education
There is a need for joint and orchestrated efforts at national and European levels to establish supervisory and regulatory actions that will protect education stakeholders from the potentially negative or harmful consequences of AI.

03 Evidence on the implications of using AI in education
There is a lack of sufficient evidence and research to demonstrate the implications of using AI systems in education.

04 Need for a broad view on AI Literacy
It’s imperative to support member states to equip their citizens with the necessary competences to use AI responsibly and understand its implications on daily life.

05 Active involvement of the key stakeholders
Key stakeholders, such as educators, parents and learners, should be actively involved and consulted in the development of such policies and strategies for specific purposes since they are directly and explicitly affected by them.

06 Capacity of member states to respond
Out of 46 Council of Europe member states invited to the survey, 25 provided valid responses, representing just over half. While survey length and topic may have impacted participation, the response rate still reflects member states’ capacity to engage with the subject. Further dialogue with member states will ensure broader understanding of their evolving engagement with AI and education.
Legal Instrument on Regulating the use of Artificial Intelligence Systems in Education

Policy Toolkit for Learning with and about Artificial Intelligence Governance – Competences – Education

European Review Framework to assess AI systems used for educational purposes and/or in educational systems
SUMMARY:
MY REFLECTIONS
WE NEED

Competence development
LA/AI-competence: technical and social aspects

Infrastructure & Support
national digital infrastructure, data management, standards & common solutions

Legal & Regulatory work
⇒ Council of Europe’s work on possible elements of a legal framework for AI
(https://rm.coe.int/possible-elements-of-a-legal-framework-on-artificial-intelligence/1680a5ae6b)
NEED RESEARCH-BASED AI FOR EDUCATION

PEDAGOGICAL INNOVATION IS NECESSARY

ASSESSMENT INNOVATION IS NECESSARY
THANK YOU!
Many technologies
Speech to Text
Text to Speech
Text to Animations
Machine Vision
Face Recognition
Searching
Planning
Scheduling
Generative AI
(text, images, animations ...)
etc.
For learners
Intelligent tutoring systems (adaptive...)
Dialogue-based tutoring
Exploratory Learning Environments
Essay generation
Essay critiquing
Chatbots
Learning Companions

For teachers
Automatic feedback generation
Forum monitoring
Essay scoring
Quiz generation
Lesson planning
Rubric generation
Smart curation of learning materials
Learning, where did you go in all the hustle and bustle?
Use of pupil and student data to promote learning

NOU (Norwegian Public Report)

6 June 2023

Pedagogical
Legal
Ethical
Infrastructure & Support
Competence needs
10 Recommendations for Higher Education

15.8 Ekspertgruppens anbefalinger

- Ekspertgruppen anbefaler at det i samarbeid med sektorene utvikles overordnede nasjonale retningslinjer for god og forsvarelig læringsanalyse. De nasjonale retningslinjene må kunne tilpasses til lokale forhold. Retningslinjene bør minst omfatte disse tiltaksområdene:
  - personvern
  - medvirkning
  - åpenhet
  - valgfrihet
  - anskaffelse

- Ekspertgruppen anbefaler at en statlig aktør utvikler og forvalter de overordnede retningslinjene for god og forsvarelig læringsanalyse i tett samarbeid med sektoraktører som Universitets- og høgskolerådet og Nasjonalt fagskoleråd. Ekspertgruppen understreker at ansvaret for god og forsvarelig læringsanalyse ligger hos institusjonene.

- Ekspertgruppen anbefaler at de overordnede retningslinjene revideres i øvrig av den raske teknologiutviklingen og minimum hvert femte år.

- Ekspertgruppen anbefaler at retningslinjene omfatter både fellesløsninger, lokale ressurser og ressurser som er fritt tilgjengelige på nett.

- Ekspertgruppen anbefaler en statslig aktør bygger opp et støttesystem for å hjelpe lærestedene med å utarbeide risikoanalyser, personvernkonsekvensvurderinger (DPIA) og databehandleravtaler. Den statlige aktøren skal også hjelpe lærestedene i forbindelse med anskaffelsesprosesser og systemutviklingsprosjekter.

- Ekspertgruppen anbefaler at retningslinjene forklarer hva som utgjør god læringsanalyse som fremmer studentenes læring.

- Ekspertgruppen anbefaler at kompetanse i læringsanalyse inkluderes i opplæringsstilbud for pedagogisk basiskompetanse i høyere utdanning og høyere yrkesfaglig utdanning. I tillegg anbefaler ekspertgruppen at læringsanalyse inngår i ulike kursstilbud rettet mot undervisere, ledere og støttepersonell som bistår undervisere, og som deltar i kvalitetsarbeid.

- Ekspertgruppen anbefaler at lærerutdanningen sikrer at nyutdannede lærere har nødvendig kompetanse i læringsanalyse og kunnskap om kunstig intelligens. Institusjonene må vurdere hvordan de kan ivareta slik kompetanse i undervisningen og i læringsutbyttebeskrivelser.

- Ekspertgruppen anbefaler at det utnyttes midler til innovasjon, forskning og utvikling på digitale læringsressurser som har funksjonalitet for læringsanalyse og adaptivitet, og midler til å forske på bruken av slike ressurser i autentiske læringsitutasjonen.

- Ekspertgruppen anbefaler at institusjonene sørger for at studentene får tilpasset og forståelig informasjon slik at de kan ta stilling til spørsmål om læringsanalyse. Videre er anbefalingen at institusjonene jevnlig evaluerer om studentene opplever at institusjonene ivaretar retten de har til medvirkning.
The use of learning analytics requires that students gain as thorough an insight as possible into which data and analysis methods are used, and how they are used, so that they can benefit from the insights the analysis provides into their own learning and academic progression.
Transparency (necessary for trust from the students)

Guidelines should require that educational institutions provide:

- **which data** is collected from **which sources**
- **how** they may be **combined** with other data
- **what** the data is actually used for
- the extent to which the individual student can be identified
- **who** has access to the data
- **when** data collection takes place
- **when** they can use digital resources without anything being tracked at an individual level
Freedom of Choice

The decision on which resources with learning analytics functionality should be available to all lecturers in HE is within the institution's framework - and the students' freedom of choice. Lecturers should have access to various resources to safeguard their freedom and responsibility to organise content and teaching methods. The scope of students' freedom of choice with respect to learning analytics should be linked to whether information about them is actually anonymised (dilemma: aggregated & deidentified data vs individual follow-up of the individual student)
Representatives from the sectors confirmed that the possibilities for learning analysis have not been specifically considered when purchasing resources for the sector. Need to support the sectors in drawing up requirements for learning analyses in tender processes and specification for requirements for inbuilt privacy and information/data security.
Support system

The expert group recommends that a state actor builds a support system to help educational institutions prepare risk analyses, data protection impact assessments (DPIA) and data processing agreements. The state actor should also help the educational institutions in connection with procurement processes and system development projects.
The expert group recommends that competence in learning analytics be included in training programmes for basic pedagogical competence in higher education and higher vocational education. In addition, the expert group recommends that learning analytics be included in various course programmes aimed at teachers, managers and support staff who assist teachers and who participate in quality work.
The expert group recommends that teacher education programmes ensure that newly qualified teachers have the necessary expertise in learning analytics and knowledge of artificial intelligence. The institutions must consider how they can safeguard such competence in the teaching and in learning outcome descriptions.
Funding

The expert group recommends that funding be announced for innovation, research and development of digital learning resources that have functionality for learning analytics and adaptivity, and funding for research into the use of such resources in authentic learning situations.
The expert group recommends that the institutions ensure that students receive customised and comprehensible information so that they can consider questions about learning analysis. Furthermore, the recommendation is that the institutions regularly evaluate whether students feel that the institutions meet their right to participation.
We need a larger body of experience that shows different effects of learning with AI & in the use of AI to understand learning (LA) (Discipline based) (Human-AI collaboration)