

Implementing Learning Analytics in Norway: Four Central Dilemmas

Barbara Wasson¹, Michail Giannakos², Marte Blikstad-Balas³, Per Henning Uppstad⁴, Malcolm Langford⁵ and Einar D. Bøhn⁶

Abstract

In June 2022, the Norwegian Expert Commission on Learning Analytics delivered an interim report to the Norwegian Minister of Education and Research. Motivated by the need to establish a solid foundation upon which to regulate and promote the use of learning analytics in the Norwegian educational sector, the Ministry asked the Expert Commission to investigate the relevant pedagogical, ethical, legal, and privacy issues. Addressing primary, secondary, higher, and vocational education, the interim report surveys the field of learning analytics and the regulatory environment across the contexts and analyzes its challenges and opportunities for Norwegian education. Four dilemmas — data, learning, governance, and competence — signal where greater knowledge, awareness, and reflection are needed, as well as the nature of necessary policy and regulatory choices. In this practical report, we offer insights on the use, development, and regulation of LA in different countries, describe the Expert Commission mandate, work method, and dilemmas, and conclude with a reflection on the relationship between research on learning analytics and the challenges that arise when implementing learning analytics in practice. This practical report is relevant for those interested in developing policies or practices surrounding the use of learning analytics at the local or national level.

Notes for Practice

- Prior national and international initiatives have highlighted the vital role of LA in the modernization of educational systems (e.g., ET 2020 Working Group on Digital Skills and Competences, 2016; Scheffel et al., 2019; Ferguson et al., 2016). More recently the need for, and possibility of, implementing learning analytics has driven some universities to develop guidelines and policies for the use of learning analytics.
- This practical report offers insights on the use, development, and implementation of LA in different countries. It also outlines the formation and activities of the Norwegian Expert Commission on LA.
- Finally, this practical report describes the interim outcome of the Norwegian Expert Commission, which comprises four key and common dilemmas when designing and implementing learning analytics in primary, secondary, higher, and vocational education.
- Thus, the example from Norway as a European country in the forefront of LA developments (Ferguson et al., 2016), with clear and early interest in implementing LA (e.g., see NOKUT, 2013; Søyby, 2014), is enlightening and can serve as a springboard for other countries and national authorities wanting to initiate a national dialogue for implementing LA.

Keywords: Learning analytics practice, learning analytics policy, learning analytics implementation dilemmas

Submitted: 24/09/2023 — **Accepted:** 13/05/2024 — **Published:** 25/07/2024

Corresponding author ¹Email: barbara.wasson@uib.no Address: Centre for the Science of Learning & Technology, University of Bergen, Christiesgate 12, 5020 Bergen, Norway. ORCID iD: <https://orcid.org/0000-0003-4897-1394>

²Email: michailg@ntnu.no Address: Department of Computer Science, NTNU, Sem Sælandsvei 9, 7491, Trondheim, Norway. ORCID iD: <https://orcid.org/0000-0002-8016-6208>

³Email: marte.blikstad-balas@ils.uio.no Address: Department of Teacher Education and School Research, University of Oslo, Moltke Moes vei 35, 0851 Oslo, Norway. ORCID iD: <https://orcid.org/0000-0002-5029-6837>

⁴Email: per.h.uppstad@uis.no Address: National Centre for Reading Education and Research, University of Stavanger, Professor Olav Hanssens vei 10, 4021 Stavanger, Norway. ORCID iD: <https://orcid.org/0000-0002-5775-9830>

⁵Email: malcolm.langford@jus.uio.no Address: Centre on Experiential Legal Learning, University of Oslo, Kristian Augusts gate 17, 0164 Oslo, Norway. <https://orcid.org/0000-0002-5975-4320>

1. Introduction

Data analytics is now an integral part of many areas of society, such as national security, surveillance, healthcare, energy, business, public transport, and, increasingly, education (Loebbecke & Picot, 2015). Research has shown the utility and promise of learning analytics (LA) on the micro level (learning and teaching), meso level (educational organizations), and macro level (nationally or across organizations; Drachsler, 2023). However, while data analytics has predominantly been conceptualized as a technological innovation with technological attributes (e.g., volume, variety, and velocity of data), successful implementation requires us to see its use as a 1) socio-technical phenomenon that 2) affects different stakeholders. This first feature means that the move from pilots to practice is complex, given the deep variation in each learner and learning context. The second feature results in a host of interests that need to be navigated, not least those of data privacy law and the ethics of algorithms. The result is that in many countries, LA is poorly or problematically utilized (by schools) or underutilized (by universities).

Norway is no exception to this trend. Many universities and colleges already use data to inform, enhance, and support their teaching and learning activities. For example, Uninett (now part of Sikt¹) initiated the technical infrastructure and interoperability in the Norwegian national research and education network called Dataporten (Norwegian for “data gate”) with the goal of connecting data sources and end-user applications and allowing better sharing of data. Another initiative, started in 2018 by the Norwegian Agency for Quality Assurance in Education (NOKUT²), is the study barometer (Studiebarometeret³). Studiebarometeret is a national online survey-based quality assurance tool that collects and visualizes data from most study programs in Norwegian universities, colleges, and higher vocational schools (covering approximately 1,800 study programs). While the growing research and development field is highlighting the potential of LA, its practice has increasingly become the subject of contention.

Therefore, in September 2021, the Norwegian Ministry of Education and Research (hereinafter the Ministry) formed an Expert Commission on Learning Analytics (hereinafter the Expert Commission) to provide the Ministry with a better basis for decisions on learning analytics and adaptive learning materials, tests, and examinations in primary and secondary education, higher education, and higher vocational education, and to provide advice on the need for regulation and input for policy development and measures from the Ministry and subordinate agencies. Specifically, the Expert Commission was tasked with investigating the pedagogical and ethical issues related to the use of learning analytics, as well as to address legal issues and privacy considerations. The Expert Commission was also mandated to consider the need for new national regulations, guidelines, and competence development.

This practical report⁴ provides the interim results of this Expert Commission, including a description of the process instigated for the development of a more systematic approach to the policy, regulation, technological ecosystem, and culture surrounding LA in Norway. The manuscript begins with a brief description of the international context in both the application of LA and the emergence of some national policies on LA before giving a brief description of the Norwegian national developments of LA. Then, the central findings in the Expert Commission’s first report (Ekspertgruppen for digital læringsanalyse, 2022) — which cover the four central dilemmas of data, learning, governance, and competence — are presented. In particular, this practical report provides the following contributions:

- Offers insights on the use, development, and regulation of LA in different countries
- Outlines the formation and activities of the Norwegian Expert Commission on LA
- Describes the interim outcome of the Expert Commission in the form of four key dilemmas when designing and implementing learning analytics in primary, secondary, and higher education in the Norwegian context
- Reflects on the contributions of this practical report for others

2. International Context

Several years after LA’s inception in 2011 at the first LAK conference (Long et al., 2011), we see several countries and national and international committees recognizing LA’s potential to contribute to the quality of teaching and learning. This

¹ Sikt is the Norwegian Agency for Shared Services in Education and Research. It is a public administrative body under the Norwegian Ministry of Education and Research (<https://sikt.no/en/home>).

² NOKUT is the independent expert body under the Ministry of Education and Research. Its mandate is to contribute towards quality assurance and enhancement in education (<https://www.nokut.no/en/>).

³ <https://www.studiebarometeret.no/en>

⁴ The authors of this practical report were the academic members of the Norwegian National Expert Commission.

section presents a short thematic overview of policy engagement in LA, including infrastructures and policy development projects at the international level.

2.1. Infrastructures for LA

The ET 2020 Working Group on Digital Skills and Competences (2016) highlighted the vital role of LA in the modernization of educational systems in Europe with a study published by the European Commission's Joint Research Centre (JRC) to identify the Netherlands, Denmark, and Norway as some of the most advanced European countries regarding the development of national LA infrastructure (Ferguson et al., 2016). In 2015, JISC, the UK digital, data, and technology agency focused on tertiary education, research, and innovation, published *Code of Practice for Learning Analytics* (Sclater & Bailey, 2015), a report that identifies the responsibilities of educational institutions to ensure that LA is carried out responsibly, appropriately, and effectively.

Similar to JISC, SURF (formerly SURFnet) is the Dutch NREN (National Research and Education Network), a collaborative organization that works for IT in Dutch education and research with a goal of utilizing digitalization for improved and more flexible education and research. In 2016, they conducted a "Learning Analytics Experiment" for Dutch institutes for higher education to gain experience with learning analytics (de Wit et al., 2017), where they introduced their LA architecture and infrastructure, which was successfully tested by three higher education institutions.

In Finland, the Digivisio 2030 program⁵ enabled all Finnish higher education institutions to utilize LA and provide personalized educational experiences. To extend Digivisio's 2030 goal to K–12 schools, the Finnish Ministry of Culture and Education formed a special interest group with the responsibility of developing guidelines for the integration of LA in K–12 Finnish schools (Aguerrebere et al., 2022). Along the same lines, EDUFI (the Finnish National Agency for Education) has also been tasked with the utilization of educational data and the development of a national data repository (e.g., study records, study rights), the so-called KOSKI-system.⁶ Despite national efforts for the centralization of LA in Finland, different content providers integrate their LMSs with the national infrastructure (e.g., the national identification system called mPassId), and the information is scattered across various systems. Similar to other countries (e.g., Norway), in Finland, each municipality has the freedom to choose the LMS provider for their schools, and the collected data are not shared between the various providers and systems. At the same time, teachers maintain autonomy to adopt solutions for their learners' needs, making the utilization of LA a challenging endeavour. During the last years, an exercise-based learning environment called ViLLE has been developed (in Finland) to support different types of assignments, tutorials, and exams (Laakso et al., 2018). Approximately 60% of Finnish schools (Aguerrebere et al., 2022) use the platform with hundreds of millions of completed tasks with immediate assessment and feedback being performed every year. This infrastructure enables researchers and practitioners to access large-scale data and even conduct large-scale studies.

While for the context of this paper, the LA infrastructures in Europe are significantly more important (due to the requirement to meet the GDPR regulatory approach), during the last years, we have also seen significant infrastructural development in countries beyond Europe. For instance, in the USA, the development of LA has been driven by national policy for several years (US Department of Education, 2012) with an ambition that states and districts will enhance the use of LA in secondary schools (Alliance for Educational Excellence, 2014). Given the diversity between states and educational levels, it is difficult to assess whether this ambition has materialized. Nevertheless, most of the major LA software and EdTech suppliers are based in the USA (e.g., Blackboard Analytics), and most of the universities at the forefront of LA are US-based (e.g., many of the large-scale implementations of LA are in the USA; Sclater et al., 2016). Another example is Japan. The Japanese governmental digitization of K–12 schools includes LA. In their Global and Innovation Gateway for All (GIGA) project (2018–2022) and MEXT (Expert Meeting on Educational Data Utilization), they have been investigating how to support data exchange between learning resources and learning tools with the support of OneRoster, LTI, and xAPI. Since March 2023, 10 local LMS and learning resource vendors have succeeded in exporting their local learning logs to xAPI format. All of them utilized existing profiles published by ADL.⁷

Overall, despite any differences regarding LA, across the countries (e.g., educational systems, policies, qualifications, and levels of responsibility), there is a clear direction towards investing in and improving the infrastructures for LA. As of mid-2023, the ambition is to develop and improve the LA infrastructure and offer more capabilities to their institutes, teachers, and students.

2.2. Policy and Development of LA

During the last decade, we have also seen several EU-funded projects supporting LA policy development. The first such project was the Learning Analytics Community Exchange (LACE). LACE ran from 2014 to 2016 and brought together LA

⁵ <https://digivisio2030.fi/en>

⁶ <https://www.oph.fi/en/node/1553>

⁷ Details provided by Professor Yasuhisa Tamaru, Sophia University, Tokyo.

representatives from seven European countries with the goal of developing evidence for LA, and sharing best practices for the development of LA. A result of the project was the LACE Evidence Hub, a database that brings together positive, negative, and neutral evidence about LA that support teaching and learning; it also helps to ensure that LA is applied ethically and is taken up at scale. LACE⁸ has been transformed into a Special Interest Group (SIG) of the Learning Analytics Community Europe under the guise of the International Society for Learning Analytics. A more recent EU-funded project called SHEILA⁹ (Supporting Higher Education to Introduce Learning Analytics) developed a policy framework to assist European universities in responsibly adopting LA (Scheffel et al., 2019; Tsai, Gašević et al., 2018; Tsai, Moreno-Marcos et al., 2018). The project also developed a MOOC advertised to give “an overview of learning analytics in higher education and introduces the SHEILA framework that can be used to support strategy and policy formation in addition to readiness assessment.”¹⁰

In addition to the various European research projects that funded LA either directly (e.g., SHEILA, LACE, PELARS,¹¹ AFEL¹²) or indirectly (projects focusing primarily on other aspects than LA, e.g., Go-Lab,¹³ Next-Lab,¹⁴ COMnPLAY-Science¹⁵), we have seen the development and growth of various and vibrant LA communities in Europe¹⁶ and beyond (e.g., LAK has grown, several new LASIs have been established). The increased interest and intense work of the last years on policy and development of LA has resulted in several tools and frameworks. One example is the Learning Analytics Readiness Instrument (LARI; Arnold et al., 2014), which evaluates the readiness of institutions to implement LA. Another instrument is the LALA framework (Sanagustín et al., 2019). LALA¹⁷ was developed in the context of Latin America’s higher education and allows the institute to design, implement, and evaluate LA tools. However, in addition to the various tools, frameworks, and produced evidence, as Macfadyen et al. (2014) argue, successful LA adoption also requires clear policies.

Recently, there has been an increase in interest for the development of national LA policies. For example, in addition to the previous examples, countries such as Ireland and Malta have highlighted the potential of LA. In Ireland, the National Forum¹⁸ has ranked LA within the top five institutional priorities for Irish universities. In Malta, the National Strategic Action Plan for Further and Higher Education¹⁹ highlights LA as one of the key technologies that can revolutionize tomorrow’s learning by personalizing learning content and monitoring learner behaviour. Thus, as our understanding and expertise grow, there is a gradual lean towards strategic embeddedness that contributes to a strategic, efficient, sustainable, national LA infrastructure.

3. Norwegian Context

The concept of LA was first introduced in Norway in 2013 in two reports and an open statement by the Norwegian Minister of Education and Research. The Norwegian Agency for Quality Assurance in Education (NOKUT, 2013) introduced the concept of *digital læringsanalyse* (learning analytics) and showed how it can be used to make a real contribution to quality development and quality assurance in education. On 25 November 2013 in Brussels, during his speech to the Council of the Europe, the Norwegian Minister of Education and Research, Torbjørn Røe Isaksens, stated, “We also need to initiate and fund more research, both on the new provisions of learning opportunities and the large amounts of data produced by these systems. Next year, we [my ministry] will discuss alternatives for an initiative on interdisciplinary research in the fields learning science and learning analytics” (Søby, 2014, p. 91). Around the same time,

⁸ <https://lacesig.eu/>

⁹ <https://sheilaproject.eu/>

¹⁰ <https://edge.edx.org/courses/course-v1:UC3Mx+IT.2x+3T2019/about>

¹¹ <https://cordis.europa.eu/project/id/619738>

¹² <https://cordis.europa.eu/project/id/687916>

¹³ <https://cordis.europa.eu/project/id/317601>

¹⁴ <https://cordis.europa.eu/project/id/731685>

¹⁵ <https://cordis.europa.eu/project/id/787476>

¹⁶ Details provided by Professor Yasuhisa Tamaru, Sophia University, Tokyo. For example, in the Nordic countries, the Nordic Learning Analytics Summer Institute (NLASI) is organized every year, while in Spain, the Spanish Network of Learning Analytics (SNOLA) is an annual gathering that brings together LA researchers and practitioners.

¹⁷ Erasmus+ project on Learning Analytics Application in Latin America (LALA): https://ec.europa.eu/programmes/erasmus-plus/project-result-content/1d22f56f-4f5d-4f27-9564-44b2c8826924/LALA_Bulletin_5_EN.pdf

¹⁸ https://hub.teachingandlearning.ie/wp-content/uploads/2021/06/TL_LA-Briefing-Paper_WEB.pdf

¹⁹ https://meae.gov.mt/en/Public_Consultations/MEDE/Documents/MFHEA%20National%20Strategic%20Plan%202030.pdf

LA was also mentioned by an Expert Commission²⁰ appointed by the Ministry to investigate the role of MOOCs (Massive Open Online Courses) in higher education in Norway. The Expert Commission released an interim report, *Tid for MOOC²¹* (Time for MOOCs), in December 2013 and a final report entitled *MOOC til Norge* (MOOCs to Norway; Opplæringslovutvalget, 2014) in 2014, which further highlighted the potential of LA. The recommendation by both the expert committee and the minister for funding a new research milieu on learning analytics resulted in the Centre for the Science of Learning & Technology²² (SLATE) at the University of Bergen.

In 2017, the Norwegian Ministry released a strategy document for the digitalization of primary and secondary education in Norway (Kunnskapsdepartementet, 2017), with clear reference to the importance of using LA to recommend learning materials that support students' individual needs and abilities. In this document, the association between LA and adaptive learning is clearly highlighted, and this association is inherited in most subsequent policy documents. This explicit link is not surprising, since Norwegian educational policies tend to highlight every student's right to an education adapted to their own needs (Fasting, 2013). In addition, the participation of the AVT project (Morlandstø et al., 2019; Wasson et al., 2019) in the Norwegian data protection authority's Sandbox for Artificial Intelligence raised a number of important issues about the use of student data for learning analytics and adaptive learning and the specificity of the Norwegian education laws (Datatilsynet, 2022).

In the new Education Act of 2019 (Opplæringslovutvalget, 2019), the Ministry discussed issues related to privacy and personal data and proposed the formation of an Expert Commission to consider the use of LA (referred as *digital læringsanalyse*) in all levels of schooling in Norway. In summary, Norway is one of the first countries to introduce LA to its policy documents and (some years ago, decided) to set up a committee to consider the use of LA. Thus, Norway is at the forefront of LA developments in Europe (Ferguson et al., 2016) with clear and early interest (e.g., see NOKUT, 2013; Soby, 2014). This interesting case can serve as a springboard for other countries and national authorities willing to initiate a national dialogue for implementing LA.

4. National Expert Commission on Learning Analytics

In September 2021, motivated by the need for a solid foundation upon which to make decisions about the use of LA in the Norwegian educational sector and the proposed new Education Act of 2019 (Opplæringslovutvalget, 2019), the Ministry of Education and Research appointed²³ a national Expert Commission on Learning Analytics to 1) examine the pedagogical, ethical, legal, and privacy issues related to the use of learning analytics, 2) provide advice on the need for regulatory development and, 3) give input on good practice in using learning analytics. The Expert Commission was asked to deliver an interim report in June 2022 and a final report in June 2023. In the following subsections, we provide details about the mandate, formation, procedure, and activities of the Expert Commission over a period of two years.

4.1. The Mandate

Based on Ministry's mandate,²⁴ the Expert Commission was to provide the Ministry 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 and underlying agencies (e.g., Directorates). The work was to include **assessment of the possibilities that lie in the tools of the future and how the market for adaptive teaching aids will develop**. Furthermore, the task force was to **give input to the education sector on how good practice** can be developed regarding the use of learning analytics **in line with ethical and pedagogical norms and current regulations**. The input for **good practice was to address the following:**

- Universities, colleges, vocational schools, municipalities, and county councils **as data controllers**
- Universities, colleges, vocational schools, and schools **as educational institutions**
- Individual teachers and instructors
- Distinguishing between learning analytics for use with the individual pupils/students and the use of data from learning analytics tools for research and more general development of education

²⁰ <https://www.regjeringen.no/no/dokumenter/mooc-utvalgets-forste-rapport/id747921/>

²¹ https://www.regjeringen.no/globalassets/upload/kd/vedlegg/uh/styrer_rad_utvalg/moocutvalget_delrapport_1_13122013.pdf

²² <https://slate.uib.no>

²³ <https://www.regjeringen.no/no/dep/kd/org/styrer-rad-og-utvalg/ekspertgruppen-for-digital-laringsanalyse/id2921391/>

²⁴ The Mandate of the Expert Commission:

<https://www.regjeringen.no/contentassets/9e30a59278904013b2acfa01c509c7d7/mandat-ekspertgruppe-digital-laringsanalyse.pdf>

The mandate also specified the following guiding questions:

- How does learning analytics affect learning?
- What are the challenges and potential of learning analytics?
- How can the regulations provide the right support for the sector?
- What skills does the education sector need to make good judgments about learning analytics?

Moreover, the mandate also highlighted that the Expert Commission must obtain views from different stakeholders and groups in its work, including school owners (e.g., municipalities), the different educational institutions and key players in the market (e.g., EdTech), as well as exchange experiences with relevant environments nationally and internationally. Students were also to be given an age-appropriate opportunity to give input to the Expert Commission’s work.

4.2. Formation of the Expert Commission

To fulfill this mandate, the Ministry appointed a national Expert Commission on Learning Analytics²⁵ made up of experts within schooling and education, learning analytics, as well as experts from relevant subject areas such as ethics, technology, and law. Each member represented themselves and their own expertise, and not that of their institution. Figure 1 lists the members of the Norwegian Expert Commission on LA alongside their affiliation.

EXPERT COMMISSION	
Marte Blikstad-Balas, Professor	Department for Teacher Education and School Research, University of Oslo (<i>task force leader</i>)
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)
<i>(Ministry of Education, Secretariat: Hilde Hultin, Jon Lanestedt, Øystein Flø Baste)</i>	

Figure 1. Members of the Norwegian Expert Commission on Learning Analytics.

4.3. Procedure and Activities

After the appointment, the Expert Commission structured its work with monthly or bimonthly meetings and milestones. Figure 2 represents the timeline of their work, from the establishment of the workforce in September 2021 to the delivery of the interim report in June 2022. During this period, the task force met four times, had six hearings, and received input from more than 11 national actors on the open feedback channel on the Expert Commission website; details about the input received can be found online (in Norwegian).²⁶

²⁵ <https://www.regjeringen.no/no/dep/kd/org/styrer-rad-og-utvalg/ekspertgruppen-for-digital-laringsanalyse/id2921391/>

²⁶ <https://laringsanalyse.no/innsspill>

TIMELINE

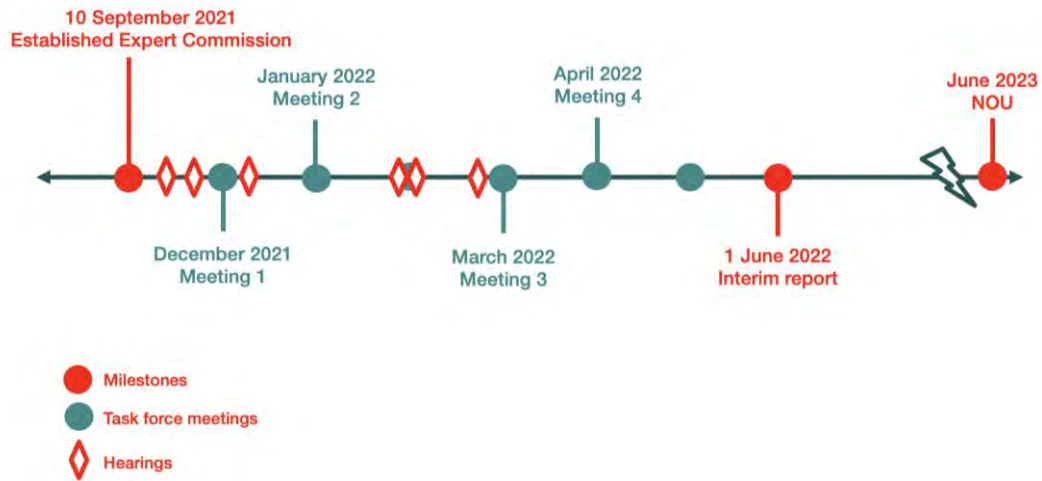


Figure 2. Timeframe of the work of the Expert Commission.

Following the mandate, the Expert Commission obtained input and feedback from different stakeholders and groups. Table 1 depicts the list of actors who gave input (either in writing or in one of the open meetings). Besides the open meetings and invitations to major national organizations (e.g., teaching organizations, universities; for details, see Table 1), the Expert Commission also invited anyone (e.g., individual students and teachers) to submit their input via a dedicated online form.²⁷ The feedback received was then discussed during the meetings and used to provide advice to the Ministry (i.e., the interim and final reports).

Table 1. List of actors invited to give input to the Expert Commission

Teacher organisations	Utdanningsforbundet, Norsk Lektorlag, Skolenes landsforbund, Skolelederforbundet
Pupil & Student organisations	Elevorganisasjonen, Norsk studentorganisasjon, Organisasjon for Norske Fagskolestudenter
Municipalities	Asker, Lillestrøm, Lørenskog, Oslo, Surnadal (IKT-ORKidé-samarbeidet), Voss, Møre og Romsdal, Vestfold og Telemark, Vestland og KS
Universities and Colleges	Norges miljø- og biovitenskapelige universitet (NMBU), Norges teknisk-naturvitenskapelige universitet (NTNU), Samisk høyskole, Universitetet i Bergen, Universitetet i Oslo, Universitetet i Stavanger, Universitetet i Sørøst-Norge og UIT Norges arktiske universitet
EdTech suppliers, sellers, and industry organisations	BS Undervisning, Cappelen Damm, Cyberbook, Conexus, Disputas, Fagbokforlaget, Gyldendal, Hypatia, Kikora, LearnLab og IKT-Norge
Legal group	Jon Christian Fløysvik Nordrum, Mona Naomi Lintvedt, Sebastian Schwemer, Emily Weitzenboeck, Malgorzata Cyndecka og Trude Haugli
Others	Sametinget

Source: Ekspertgruppen for digital læringsanalyse, 2023, p. 12.

²⁷ <https://laringsanalyse.no/for-elever-og-studenter/>

In June 2022, the leader of the Expert Commission, Professor Marte Blikstad-Balas, delivered the interim report²⁸ to Minister Tonja Brenna. The report, *Læringsanalyse — noen sentrale dilemmaer* (Learning Analytics — some central dilemmas), was the result of seven months of intense work.

5. The Dilemmas

To make sense of the expertise, input, concerns, and wishes, the Expert Commission formulated the interim report as a series of dilemmas that present the possibilities and challenges related to the implementation of learning analytics. Due to the complexity and varying views from stakeholders and experts, dilemmas offered a way in which to capture the complex nature of implementing learning analytics in practice. Many discussions led to this decision to use a dilemma approach, and these four dilemmas capture, in our context in Norway, the essence of the possibilities and challenges in the adoption of learning analytics in our educational sectors with regards to pedagogical, ethical, legal, and privacy aspects.

The dilemmas and the points of reflection presented in the interim report need to be considered when developing Norwegian LA policy. In particular, the four dilemmas are as follows: 1) the need for information vs. data protection, 2) learning as an individual process vs. a social process, 3) centralization vs. autonomy, and 4) competence needs vs. competence reality. This section addresses the key issues raised with a summary of each dilemma and a brief description of its key points. Our intention is not to provide a translation of the whole interim report (Ekspertgruppen for digital læringsanalyse, 2022) but rather to provide a highlight of the process and main outputs that might be helpful for other expert groups and national authorities working with initiating a national dialogue for implementing LA. The summaries and key points are not a direct verbatim translation from Norwegian; rather, they are our interpretation of the main points.

Dilemma 1: The need for information vs. data protection

Summary: To safeguard the privacy of pupils and students, we see a need for a thorough discussion and investigation of what data should be included in learning analytics at the different levels of education. The scope for the authorities and professions must be made clear so that they can explore the potential of learning analytics within a responsible framework. Furthermore, professional ethical and pedagogical discussions must be facilitated about what kind of information needs to be obtained from learning analytics. These discussions require transparency about what data and processes are included in learning analytics and how the data are used to support learning.

Key points:

1. **Information for quality development.** The main argument for collecting data for learning analysis is the potential to improve the quality of teaching and learning.
2. **Early intervention.** An important aspect of using learning analysis is to quickly identify pupils and students who need extra support in one way or another (e.g., identify potential dropouts or challenges with learning) for early intervention.
3. **When does information gathering become surveillance?** The boundary between appropriate information gathering and invasive surveillance needs attention. In general, it is difficult to make a clear distinction between information that contributes to better learning and follow-up and information that is just “nice” to have access to (i.e., data minimization).
4. **Where is the limit for privacy?** When students work in digital learning environments, the boundary between learning and their private life might intertwine. Thus, it becomes necessary to clarify what kind of data can be regarded as private, and which should therefore not be included in learning analysis.
5. **Does the information give a correct picture?** The insights we get from learning analytics do not always give us the complete and accurate picture of student learning. It must always be interpreted and seen in connection with other information we have.
6. **Is assessment influenced by information on learning behaviour?** When using learning analysis for assessment, there is a substantial risk that information that primarily says something about student effort is given more attention than information about the achievement of learning goals (i.e., competence).

Dilemma 2: Learning as an Individualized Process vs. a Social Process

Summary: We are committed to ensuring that learning analytics, where used, underpins an active and exploratory approach to learning in social interaction. This requires that the data collected provides information about such learning. We therefore question whether current digital learning materials, resources that use learning analytics, and the digital

²⁸ <https://www.regjeringen.no/no/dokumenter/laringsanalyse-noen-sentrale-dilemmaer/id2916747/>

teaching practices in Norwegian education generate sufficient data to provide meaningful analyses that can support variation in teaching and learning as a social activity.

Key points:

1. **Individual ways of working with digital resources.** There is a concern that learning analytics may reinforce the use of digital tools that provide individual quantifiable results for only a few subject areas, narrowing the breadth of the educational mission.
2. **Active and exploratory learning in interaction with others.** For learning analytics to provide information about active and exploratory learning in interaction with others, the digital resources must provide more than “drill and practice” and support creative, exploratory forms of learning.
3. **Safety to try and fail.** In a learning analytics context, it can be challenging to create sufficient room for trial and error if learners are too preoccupied with collecting data on the learning process as they work; pupils and students need to feel safe enough to experiment.
4. **Can individual data be used to say something about interaction?** For learning analytics to be used to support learning as a social process, we need a data basis that tells us something about interaction.

Dilemma 3: Centralization vs. Autonomy

Summary: We see a need for a thorough assessment of which decisions about learning analytics should be centralized in various ways, and which should leave more room for flexibility and local adaptation. Such an assessment should be seen in the context of centrally managed standardization work in learning analytics. The aim of the work must be to develop good standards that safeguard and enable pedagogical diversity giving local manoeuvring room.

Key points:

1. **Where are the decisions made?** The question of who makes the various decisions affecting learning analytics is central in our understanding of the degree of centralization and local adaptation, and which actors and levels are involved. It can be challenging to achieve good procurement processes if the soundness and legality of digital learning materials are to be assessed at a more central level than the content and quality of the learning materials.
2. **Centralized = Approval?** Clarity in the relationship between making central decisions about digital tools and a stamp of approval for the tool need to be addressed.
3. **Does centralization hinder innovation?** A digital ecosystem where systems, services, and solutions interact is a national goal for digitalization policy in the public sector, including formalized co-management of a digital ecosystem for primary and secondary education. Will this favour large resource developers (e.g., publishers) rather than smaller SMEs or research-based tools where innovation often takes place?
4. **Centralized standardization work.** Well-functioning standards for data exchange within learning analytics (e.g., xAPI, secure data exchange portals) can serve as a driver for diversity in the EdTech market.

Dilemma 4: Competence Needs vs. Competence Reality

Summary: We recognize that there is a significant gap between competence needs and competence realization. There is a need for skills development for teachers and educators if learning analytics are to be used to support learning. At the same time, the design of digital resources must consider their competences and build on current practice in education. Furthermore, expectations for the competences of teachers and educators must be reasonable, and the technology providers need to provide tools/resources that are more transparent.

Key points:

1. **Vision and reality.** To use digital technology and learning analytics in ways that promote learning, it is crucial that teachers and educators have sufficient digital competences; this is currently lacking at all levels of education.
2. **Competence needs in connection with learning analysis.** The use of the tools for learning analytics that are available in Norwegian education today places new demands on the digital expertise of teachers and educators, including critical evaluation of use, opportunities/limitations, ethics/privacy protection, interpretative understanding of dashboards and visualizations, and most of all the effect it will have on student learning.
3. **What do we risk if the gap between vision and reality is not closed?** While we do not have a solid Norwegian knowledge base about the potential of learning analytics to improve learning, there is a clear perception that learning analytics can help give teachers and educators better insight into the learning processes they are trying to promote in their pupils and students. Thus, not closing the gap could lead to a missed opportunity to utilize a large amount of information that could have promoted learning.
4. **Is competence development the only answer?** Apart from fostering competence development, the resources that utilize learning analytics must be developed for, and adapted to, current teaching practices and skills levels in a

more seamless way than today. To complement this, there is a need to place responsibility on the technology providers to provide more transparency on how their technology works and how the information they produce aligns with the pedagogical theories commonly employed by teachers and educators.

6. Conclusion and the Way Ahead

Despite the growing interest by several countries in utilizing LA, its adoption has mostly been found to be small in scale and isolated at the instructor or study program level (e.g., Tsai et al., 2020). The availability of LA tools and practices alone does not drive the effective and responsible use of LA (Tsai, Gašević et al., 2018). It is widely accepted that to ensure LA's effective and responsible use, the next step is for nations to consider the views of different stakeholders and develop institutional and national guidance (Hilliger et al., 2020; Tsai et al., 2020). Despite the importance of this step, very few countries have made such initiatives. Thus, the overarching contribution of this practical report is the dissemination, contextualization, and summary of a national approach to LA policy development, filling a gap in such insights into national LA policy development. Today, one can find universities and other institutions that have developed policies and regulations regarding the use of LA and educational data.²⁹ However, the lack of clear national guidance when it comes to LA policy and high diversity across different national institutes (Tore et al., 2015) hinders the development and potential impact of LA.

Previous work has recommended that a policy should ensure that the use of LA is legal, ethical, and strategic (Ferguson et al., 2014). In an Australian study, Colvin et al. (2015) highlight that for LA to be efficient, it must be implemented under a strategic vision that considers organizational needs. This is likely to have a long-term impact. At the same time, national LA policy guidance allows us to overcome barriers of purposeful and tactical use of LA and utilize educational data and LA in a way that highlights national goals rather than institutional targets and agendas (Macfadyen & Dawson, 2012). Therefore, LA will benefit from national guidance that considers both the national strategic vision and the socio-technical needs of educational institutions.

Thus, it is imperative that national institutions be given clear guidance when it comes to LA policy. Such guidance will be particularly useful for countries such as Norway, where most universities and educational institutes are public and, therefore, must adhere to national policies. LA guidance must consider several dimensions including institutional contexts and capacities, pedagogical approaches, as well as numerous legal and ethical considerations. Such guidance should also be malleable so that institutions can make it relevant to their contexts and stakeholders while meeting national goals.

Considering all this, the contribution of this practical report is threefold. First, it presents insights into the development of national policies for LA in different countries (in a non-excessive manner). Second, it provides a one-of-a-kind and tested process for developing national guidance when it comes to LA, which can serve as a springboard for other countries and institutes. Third, it provides the midway results of the Norwegian Expert Commission on Learning Analytics, presented in the interim report as four dilemmas to be considered when implementing LA.

Finally, the learning analytics scientific community offers the academic expertise needed for learning analytics policy work. We believe this practical report on the approach chosen in Norway will provide insight to academics invited into such processes, to legal experts, and to the policy-makers who will drive such processes. The process in which the Expert Commission engaged provided an opportunity to bridge theory and practice (e.g., discussions about what learning analytics is and on the pedagogical implications) and to highlight the ethical and legal issues that arise in practice.

6.1. Implications and Limitations

In addition to expertise provided by the Expert Commission, the primary input to the interim report was received from consultations with the various stakeholders (see Table 1); this allowed us to take advantage of their knowledge and experiences on challenges and opportunities associated with the practical use and adoption of LA. As a result, this practical report is limited in its diversity of perspectives, as it is bound to the Norwegian reality. Thus, the identified dilemmas are not exhaustive, and their priority will depend on different contextual and cultural determinants. However, they offer a clear set of priorities extracted from our stakeholders, providing a clear avenue for future research needed to inform those communities. Furthermore, evidence-based input to identify the dilemmas raises the likelihood that addressing such dilemmas will contribute to future LA adoption in practice.

²⁹ Lancaster University: <https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/strategic-planning--governance/publication-scheme/5-our-policies-and-procedures/Learner-Analytics-Policy.pdf>;

University of Auckland: <https://www.auckland.ac.nz/en/about-us/about-the-university/policy-hub/enabling-environment/digital/data-governance-analytics/learning-analytics-principles-policy.html>;

Aalto University: <https://www.aalto.fi/en/aalto-university/learning-analytics-policy-in-aalto-university>;

University of Glasgow: <https://www.gla.ac.uk/myglasgow/apg/policies/regulationsandguidelines/learninganalyticspolicy/>

6.2. The Way Forward in Norway

It is encouraging that the Ministry of Education and Research in a European country that is in the forefront of LA decided to investigate the potential and challenges to implement LA more systematically and used its mechanisms to form an Expert Commission.³⁰ It is also encouraging that due to the breadth and depth of perspectives raised in the interim report, the final report has been elevated to an Official Norwegian Report (Norges offentlige utredninger [NOU]). NOUs are a series of government reports (white papers) whose purpose is to present and discuss the knowledge base and possible courses of action or strategies for a governmental development and implementation of public measures to solve societal problems and challenges.³¹ A NOU report is subject to political processing in the Ministry that has had overall responsibility for the report. The NOU from the Expert Commission on Learning Analytics was delivered in June 2023 (Ekspertgruppen for digital læringsanalyse, 2023).

Declaration of Conflicting Interest

The authors (academic members of the Expert Commission) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors were paid by the Ministry of Education and Research as members of the Expert Commission; however, the writing of the article was NOT part of this work.

Acknowledgments

The authors would like to thank the other members of the Expert Commission — Monica Andreassen, Ann-Tove Eriksen, Hedda Huse, and Erin Oda Lauvset — for excellent discussions. In addition, we thank the Ministry of Education and Research Secretariat — Hilde Hultin, Jon Lanestedt, and Øystein Flø Baste — for their invaluable work in noting the details of our discussions and producing the excellent text for us to edit. Finally, we would like to thank the Norwegian Ministry of Education and Research for establishing this Expert Commission and entrusting us with this important work.

Key documents from this work are available in the following Internet archives:

- Ekspertgruppen for digital læringsanalyse. (2022). *Læringsanalyse – noen sentrale dilemmaer: Delrapport fra ekspertgruppen for digital læringsanalyse* [Learning analysis – some key dilemmas: Interim report from the expert group for digital learning analytics] (in Norwegian). Interim report of the Expert Commission for Learning Analytics. <https://www.regjeringen.no/no/dep/kd/org/styrer-rad-og-utvalg/ekspertgruppen-for-digital-laringsanalyse/id2921391/>
- Ekspertgruppen for digital læringsanalyse. (2023). *Læring, hvor ble det av deg i alt mylderet? Bruk av elev- og studentdata for å fremme læring* [Learning, where did you go in all the bustle? Use of pupil and student data to promote learning] (in Norwegian). <https://www.regjeringen.no/no/dokumenter/nou-2023-19/id2982722/>
- Official website of the Norwegian Expert Commission on Learning Analytics: <https://laringsanalyse.no/>
- Appointment of the Norwegian Expert Commission on Learning Analytics: <https://www.regjeringen.no/no/dep/kd/org/styrer-rad-og-utvalg/ekspertgruppen-for-digital-laringsanalyse/id2921391/>

References

- Aguerreberre, C., He, H., Kwet, M., Laakso, M.-J., Lang, C., Marconi, C., Price-Dennis, D., & Zhang, H. (2022). Global perspectives on learning analytics in K12 education. In C. Lang, A. F. Wise, A. Merceron, D. Gašević, & G. Siemens (Eds.), *Handbook of learning analytics* (2nd ed., pp. 223–231). Society for Learning Analytics Research. <https://doi.org/10.18608/hla22.022>
- Alliance for Educational Excellence. (2014). Capacity enablers and barriers for learning analytics: Implications for policy and practice: An executive summary. <https://all4ed.org/wp-content/uploads/2014/06/LearningAnalyticsExecSum.pdf>

³⁰ The government or a ministry may constitute a committee and working groups who report on different aspects of society. A report can either be published as a standard report or as an Official Norwegian Report (Norges offentlige utredninger [NOU]).

³¹ Such public inquiries normally — if not always — constitute the first step in a longer public decision-making process on a specific issue.

- Arnold, K. E., Lonn, S., & Pistilli, M. D. (2014). An exercise in institutional reflection: The learning analytics readiness instrument (LARI). *Proceedings of the 4th International Conference on Learning Analytics and Knowledge (LAK '14)*, 24–28 March 2014, Indianapolis, IN, USA (pp. 163–167). ACM Press.
<https://doi.org/10.1145/2567574.2567621>
- Colvin, C., Rogers, T., Wade, A., Dawson, S., Gašević, D., Buckingham Shum, S., Nelson, K., Alexander, S., Lockyer, L., Kennedy, G., Corrin, L., & Fisher, J. (2015). *Student retention and learning analytics: A snapshot of Australian practices and a framework for advancement*. Australian Government, Office for Learning and Teaching.
https://www.pure.ed.ac.uk/ws/portalfiles/portal/21121591/Final_Report_190615.pdf
- Datatilsynet. (2022). AVT: Sluttrapport fra sand-kasseprosjektet med KS, SLATE ved UiB og Utdanningsetaten i Oslo kommune. <https://www.datatilsynet.no/regelverk-og-verktoy/sandkasse-for-kunstig-intelligens/ferdige-prosjekter-og-rapporter/avt-sluttrapport>
- de Wit, M., van Dompsele, H., & Manderveld, J. (2017). How to start with learning analytics? Infrastructure and support. *Proceedings of the 23rd Congress of European University Information Systems (EUNIS 17)*, 7–9 June 2017, Münster, Germany (pp. 161–168). https://www.eunis.org/download/2017/EUNIS_2017_paper_18.pdf
- Drachler, H. (2023). *Towards highly informative learning analytics*. Open Universiteit. <https://doi.org/10.25656/01:26787>
- Ekspergruppen for digital læringsanalyse. (2022). *Læringsanalyse – noen sentrale dilemmaer: Delrapport fra ekspergruppen for digital læringsanalyse* [Learning analysis – some key dilemmas: Interim report from the expert group for digital learning analytics]. Kunnskapsdepartementet.
<https://www.regjeringen.no/no/dokumenter/laringsanalyse-noen-sentrale-dilemmaer/id2916747/>
- Ekspergruppen for digital læringsanalyse. (2023). *Læring, hvor ble det av deg i alt mylderet? Bruk av elev- og studentdata for å fremme læring* [Learning, where did you go in all the bustle? Use of pupil and student data to promote learning]. Kunnskapsdepartementet. <https://www.regjeringen.no/no/dokumenter/nou-2023-19/id2982722/>
- ET 2020 Working Group on Digital Skills and Competences. (2016). *Learning analytics: Key messages*. European Commission.
https://wikis.ec.europa.eu/display/EAC/ET+2020+Digital?preview=%2F44165766%2F80969907%2F2016-plan-learning-analytics_en+%281%29.pdf
- Fasting, M. L. (2013). *Vi leker ute! En fenomenologisk hermeneutisk tilnærming til barns lek og lekesteder*. Novus forlag.
<https://novus.no/products/102587>
- Ferguson, R., Brasher, A., Clow, D., Cooper, A., Hillaire, G., Mittelmeier, J., Rienties, B., Ullmann, T., & Vuorikari, R. (2016). Research evidence on the use of learning analytics: Implications for education policy. In R. Vuorikari & J. Castaño Muñoz (Eds.), *JRC Science for Policy Report*. European Commission.
<https://data.europa.eu/doi/10.2791/955210>
- Ferguson, R., Macfadyen, L. P., Clow, D., Tynan, B., Alexander, S., & Dawson, S. (2014). Setting learning analytics in context: Overcoming the barriers to large-scale adoption. *Journal of Learning Analytics*, 1(3), 120–144.
<https://doi.org/10.18608/jla.2014.13.7>
- Hilliger, I., Ortiz-Rojas, M., Pesántez-Cabrera, P., Scheihing, E., Tsai, Y. S., Muñoz-Merino, P. J., Broos, T., Whitelock-Wainwright, A., & Pérez-Sanagustín, M. (2020). Identifying needs for learning analytics adoption in Latin American universities: A mixed-methods approach. *Internet and Higher Education*, 45, 100726.
<https://doi.org/10.1016/j.iheduc.2020.100726>
- Kunnskapsdepartementet. (2017). *Framtid, fornyelse og digitalisering: Digitaliseringsstrategi for grunnsopplæringen 2017–2021* [Future, renewal and digitization: Digitization strategy for basic education 2017–2021]. Kunnskapsdepartementet.
https://www.regjeringen.no/contentassets/dc02a65c18a7464db394766247e5f5fc/kd_framtid_fornyelse_digitalisering_net.pdf
- Laakso, M.-J., Kaila, E., & Rajala, T. (2018). ViLLE—collaborative education tool: Designing and utilizing an exercise-based learning environment. *Education and Information Technologies*, 23(4), 1655–1676.
<https://www.learntechlib.org/p/191715/>
- Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems*, 24(3), 149–157.
<https://doi.org/10.1016/j.jsis.2015.08.002>
- Long, P., Siemens, G., Conole, G., & Gašević, D. (Eds.). (2011). *Proceedings of the 1st International Conference on Learning Analytics and Knowledge: Connecting the technical, pedagogical, and social dimensions of learning analytics (LAK '11)*, 27 February–1 March 2011, Banff, AB, Canada. ACM Press.
<https://dl.acm.org/doi/proceedings/10.1145/2090116>

- Macfadyen, L. P., & Dawson, S. (2012). Numbers are not enough: Why e-learning analytics failed to inform an institutional strategic plan. *Educational Technology & Society*, 15(3), 149–163.
- Macfadyen, L. P., Dawson, S., Pardo, A., & Gašević, D. (2014). Embracing big data in complex educational systems: The learning analytics imperative and the policy challenge. *Research & Practice in Assessment*, 9, 17–28.
- Morlandstø, N. I., Hansen, C. J. S., Wasson, B., & Bull, S. (2019). Aktivitetsdata for vurdering og tilpasning: Sluttrapport [Activity data for assessment and adaptation: Final report]. Centre for the Science of Learning & Technology (SLATE). <https://bora.uib.no/bora-xmlui/handle/1956/20825>
- NOKUT. (2013). *Learning analytics — automatisert kvalitetssikring av utdanning* [Learning analytics — Automated quality-assurance of education]. <https://kudos.dfo.no/documents/31148/files/27570.pdf>
- Opplæringslovutvalget. (2014). *MOOC til Norge: Nye digitale læringsformer i høyere utdanning* [MOOC to Norway: New digital learning forms in higher education.]. Kunnskapsdepartementet. <https://www.regjeringen.no/no/dokumenter/NOU-2014-5/id762916/>
- Opplæringslovutvalget. (2019). *Ny opplæringslov* [New education act]. Kunnskapsdepartementet. <https://www.regjeringen.no/no/dokumenter/nou-2019-23/id2682434/>
- Sanagustín, M. P., Hilliger, I., Maldonado, J., Pérez, R., Ramírez, L., Muñoz-Merino, P. J., Tsai, Y.-S., Ortiz, M., Broos, T., Zúñiga-Prieto, M., Sheihing, E., & Whitelock-Wainwright, A. (2019). LALA: Building capacity to use learning analytics to improve higher education in Latin America. LALA Project. https://research.monash.edu/files/324504028/324503712_oa.pdf
- Scheffel, M., Tsai, Y.-S., Gašević, D., & Drachsler, H. (2019) Policy matters: Expert recommendations for learning analytics policy. *Proceedings of the 14th European Conference on Technology Enhanced Learning (EC-TEL 2019)*, 16–19 September 2019, Delft, The Netherlands (pp. 510–524). Lecture Notes in Computer Science, Springer. https://doi.org/10.1007/978-3-030-29736-7_38
- Slater, N., & Bailey, P. (2015). *Code of practice for learning analytics: Setting out the responsibilities of educational institutions to ensure that learning analytics is carried out responsibly, appropriately and effectively*. Jisc. https://repository.jisc.ac.uk/6985/1/Code_of_Practice_for_learning_analytics.pdf
- Slater, N., Peasgood, A., & Mullan, J. (2016). *Learning analytics in higher education: A review of UK and international practice*. Jisc. <https://analytics.jiscinvolve.org/wp/2016/04/19/learning-analytics-in-higher-education-a-review-of-uk-and-international-practice/>
- Søby, M. (2014). Learning analytics. *Nordic Journal of Digital Literacy*, 9(2), 89–91. <https://doi.org/10.18261/ISSN1891-943X-2014-02-01>
- Tore, H., Mason, J., & Chen, W. (2015). Data sharing for learning analytics — Questioning the risks and benefits. *Proceedings of the 23rd International Conference on Computers in Education (ICCE 2015)*, 30 November–4 December 2015, Hangzhou, China (pp. 228–237). Asia-Pacific Society for Computers in Education.
- Tsai, Y.-S., Gašević, D., Whitelock-Wainwright, A., Muñoz-Merino, P. J., Moreno-Marcos, P. M., Fernández, A. R., Kloos, C. D., Scheffel, M., Jivet, I., Drachsler, H., Tammets, K., Calleja, A. R., & Kollom, K. (2018). *Supporting higher education to integrate learning analytics research report*. SHEILA Project. <https://sheilaproject.eu/2018/11/30/sheila-final-research-report/>
- Tsai, Y.-S., Moreno-Marcos, P. M., Jivet, I., Scheffel, M., Tammets, K., Kollom, K., & Gašević, D. (2018). The SHEILA framework: Informing institutional strategies and policy processes of learning analytics. *Journal of Learning Analytics*, 5(3), 5–20. <https://doi.org/10.18608/jla.2018.53.2>
- Tsai, Y.-S., Rates, D., Moreno-Marcos, P. M., Muñoz-Merino, P. J., Jivet, I., Scheffel, M., Drachsler, H., Kloos, C. D., & Gašević, D. (2020). Learning analytics in European higher education — Trends and barriers. *Computers & Education*, 155, 103933. <https://doi.org/10.1016/j.compedu.2020.103933>
- US Department of Education. (2012). *Enhancing teaching and learning through educational data mining and learning analytics: An issue brief*. <https://tech.ed.gov/wp-content/uploads/2014/03/edm-la-brief.pdf>
- Wasson, B., Morlandstø, N. I., & Hansen, C. J. S. (2019). *Summary of SLATE report 2019-1: Activity data for assessment and activity (AVT)*. Centre for the Science of Learning & Technology (SLATE). <https://bora.uib.no/bora-xmlui/handle/1956/20187>