INTRODUCTION TO LEARNING ANALYTICS

PHD COURSE, INFO900

Professor Barbara Wasson

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UNIVERSITY OF BERGEN

Introduction

The pervasive integration of digital technology in education influences both teaching and learning practices, and allows access to data, mainly available from emerging online learning environments, that can be used to improve conditions for students' learning and to improve teacher support. Increased access to previously unavailable digital learner data allows us to perform new types of analyses that aim to measure chosen learning and teaching activities more objectively compared to the use of more traditional methods that are often based on learners' and/or teachers' perceived attitudes and/or observations. These new forms of analyses constitute the field of Learning Analytics (LA), defined as the "measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs".

The LA field of research and practice is built on the developments and success of other domains and disciplines and the rapid growth of data and analytics methods. LA has achieved significant advances in multiple areas: student recommenders systems, learning dashboards, adaptive feedback, early warning systems and personalized support for students.

This course aims to provide a sound ground for the understanding of the LA area of research and practice. The course will address the taxonomy of learning analytics and related terms such as educational data mining and academic analytics. It will also present the theoretical background behind learning analytics and the concepts of the big data paradigm shift. The LA process and procedures will be discussed in detail, including data gathering, analysis and generation of insights. The key ethical and privacy issues will also be covered. The practical aspect of the course will enable the students to practice the use of different LA methods, including epistemic network analysis, social network analysis, process- and sequence mining, as well as basics of visualization.

Learning outcomes

After completing the course, the PhD student will be able to:

- Identify the taxonomy of learning analytics, the main themes and applications.
- Recognise the different theoretical models' underpinnings for the learning analytics process and apply such theories to different problems.
- Describe the learning analytics data cycle as well as how to apply these principles in research and practice.
- Identify key epistemological, pedagogical, ethical, and technical factors informing the design and implementation of learning analytics.
- Apply the basics of collecting, cleaning, transforming, and analysing educational data with real life examples.
- Apply popular data analytic techniques, including predictive models, epistemic network analysis, multimodal learning analytics, relationship mining, social network analysis, and visualizations
- Perform a research project using the learnt methodological research skills in learning analytics empirically as well as theoretically.

Course contents

In this course, PhD candidates gain theoretical as well as practical experience in state-of-the-art methods for learning analytics. After an introduction and overview of the field of learning analytics, the candidate will be introduced to, and have practice with these methods: data and quantitative LA methods, predictive models, process mining, social network analysis (SNA), quantitative ethnography, text and discourse analysis, and thematic discourse network analysis. The theme of dashboard design will be approached from the perspective of the importance of using theory to support student's learning. The final theme is the emerging area of MultiModal Learning Analytics (MMLA) is the analysis of several modalities of natural communication (e.g., speech, writing, gestures, sight) through various data collection methods including sensors, recordings, eye tracking, etc. during educational processes. The PhD candidates will engage in a hands-on workshop where they can experiment with various multimodal data collection methods and analysis of these (IF we are restricted in meeting face to face, these session will be online using already collected data sets, as will the final presentations). Finally, privacy and ethics related to the use of student data and learning analytics will be a theme that runs through all sessions.

The main activities of the course are organized in the form of online seminars comprising lectures, discussions, individual and group activities. A group project and an individual reflection note are required for approval for 5 ETCS and a final course paper is required for the additional 2.5 ETCS.

Course program

Date & Time	Lecturer(s)	Themes
	Session 1 (online)	
March 15 (9-14)	Barbara Wasson	Welcome & Introductions Course Overview Introduction to LA (*includes privacy & ethics which will run through all sessions)
	Session 2 (online)	
March 29 (9-14)	Mohammed Saqr Daniel Spikol	LA research methods 1: Data & Quantitative LA methods
	Session 3 (online)	
April 12 (9-14)	Olga Viberg Mohammed Saqr	LA research methods 2: predictive models, process mining, SNA (intro)
	Session 4 (online)	
April 26 (9-14)	Morten Misfeldt Jesper Bruun	LA research methods 3: quantitative ethnography, text and discourse analytics; thematic discourse network analysis

	Session 5 (online)	
May 10 (9-14)	Olga Viberg Barbara Wasson	Designing learning dashboards: The importance of learning theories to support students' learning
	Session 6 (KTH, Stockholm*)	
June 7 (9-14)	Daniel Spikol	MultiModal Learning Analytics (MMLA)
	Session 7 (KTH, Stockholm*)	
June 8 (9-14)	Barbara Wasson Morten Misfeldt Jesper Bruun Mohammed Saqr Jesper Bruun Olga Viberg Daniel Spikol	Final presentations with feedback
	EXTRA CREDIT	
September 30	Barbara Wasson Morten Misfeldt Mohammed Saqr Jesper Bruun Olga Viberg Daniel Spikol	Course paper due (optional)

***if possible, otherwise online**

Lecturers: Barbara Wasson (UiB), Morten Misfeldt (UCPH), Jesper Bruun (UCPH), Daniel Spikol (MAO(UCPH), Mohammed Saqr (UEF/KTH), and Olga Viberg (KTH)

Course administration

Course responsible

The course responsible at the Faculty of Social Sciences, Department of Information Science and Media Studies & the Centre for the Science of Learning & Technology is Professor Barbara Wasson.

The course will run parallel, and in collaboration with an identical course at KTH Royal Institute of Technology (KTH), and University of Copenhagen (UCPH). Participants will collaborate across the 3 courses (i.e., it will be transparent where you are registered).

Course Organisers: Barbara Wasson (UiB), Morten Misfeldt and Daniel Spikol (UCPH), and Olga Viberg (KTH)

Time and place

The course will run from 15 March – 9 June, 2021.

Place: The first 5 sessions will be online. The final 2 sessions will be held during the NORDIC Learning Analytics Summer Institute (Nordic LASI) in Stockholm, if the Covid-19 situation permits; otherwise they will be moved online as well.

Date & Time:

15 March (9 – 14)

29 March (9-14)

12 April (9 – 14)

26 April (9 – 14)

10 May (9-14)

7 June (9 – 14)

8 June (9 – 14)

ECTS

5 + 2.5 (optional paper)

Participants

The course can be taken by PhD students from *all* research disciplines.

There will be a maximum of 30 students registered. The University of Bergen, however, has a maximum of 10 students as do KTH and the University of Copenhagen.

Evaluation

The course is graded with «passed/not passed» for both parts of the course.

To complete the course (5 ETCS), students must:

- Read the literature and actively participate in the seminars, including completing the seminar exercises.
- Present a paper from the course literature or one approved by an instructor during one session
- Complete a group project to develop a proposal for a learning analytics project and present the idea at the final seminar.
- Write and submit a 2-page reflection note over what you learned during the course.

Additional Points (2.5 ECTS)

- Present your paper idea at the final seminar and receive feedback.
- Submit and get approved a 4 - 6000 word paper

Reading list

Lang, C., Siemens, G., Wise, A., & Gasevic, D. (2017). The Handbook of Learning Analytics. https://www.solaresearch.org/publications/hla-17/

Module specific literature will be specified at the beginning of the course.


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