MSc in Digital Education

COURSE GUIDE:
Learning Analytics: Process and Theory

Session 2018/19: Semester 1

Contents

Welcome

Welcome to *Learning analytics: process and theory.*

The analysis of data from user interactions with technologies is changing how organisations function, prioritise and compete in an international market. All industries have been influenced or impacted by the so called digital revolution and the associated analysis of user data. In the education sector, this wave of data analytics has flowed through the concept of learning analytics. The adoption of information systems in different aspects of the sector has afforded a new opportunity to gain insight into student learning. As with most information systems, students' interactions with their online learning activities are captured and stored. These digital traces (log data) can then be 'mined' and analysed to identify patterns of learning behaviour that can provide insights into education practice. This process has been described as learning analytics. Learning analytics offer a new premise for decision making, planning, resource allocation, teaching delivering, and intervention.
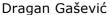
The course focuses on learning analytics process and theory and recognizes that learning analytics is a bricolage field drawing on research, methods, and techniques from numerous disciplines. This course is organised into four main sections. The first section introduces the main foundations of the field of learning analytics and its linkages with educational data mining. The second section is dedicated to two popular methods for data analysis in learning analytics – social network analysis and epistemic network analysis. The third section offers students with the opportunity to experience learning analytics tools – Loop, OnTask, and LARC. The final section will conclude the course with discussions of learning analytics policies, pedagogical interventions, and theories.

We will be working with a variety of media. We will be using the Moodle discussion forums across the 12 weeks. We will also use Moodle for the assignment submission. We will be using video media software Media Hopper to share recordings of your own presentations in this course. There are also optional synchronous sessions in Skype, Blackboard Collaborate, and Adobe Connect. Less formal activities will also be possible on Twitter.

There are many contemporary debates about learning analytics, partly fuelled by Massive Open Online Courses (MOOCs). We especially would like to draw your attention to two MOOCs with edX: *Big Data in Education*, *Practical Learning Analytics*, and *Data, Analytics, and Learning*.

So this is an interesting time to be considering what is important for learning analytics. We are looking forward to the coming 12 weeks, and to working with you.

Dragan Gašević

Yi-Shan Tsai

Course learning outcomes

The formal learning outcomes for *Learning Analytics: Process and Theory* are as follows.

On completion of the course you will be able to:

— describe and critically analyse learning analytics process and theory;
— review, integrate and critically assess emerging trends in learning analytics literature;
— develop a proposal for a piece of research or application using learning analytics in an educational setting, based on a critical understanding of the literature
— develop a detailed plan for the learning analytics application or research proposed, and critically assess its main elements.

Delivery and workload

Learning Analytics: Process and Theory – as with all our courses – is delivered entirely online using as its main delivery platform the virtual learning environment Moodle with a strong focus on cooperative class activities.

As with other 20 credit courses, successful participation will require a time commitment of around 7-10 hours a week, with more likely around the time of assignment completion (20 credit courses require 200 hours of study). Your strong commitment to the cooperative class activities is expected across the 12 weeks of the course. During each week of the course you will be engaged in group discussions, and you will have a particular responsibility to your fellow students – to provide feedback, construct knowledge, and generate ideas for your future work cooperatively.

You should aim to log in almost every day to keep track of discussions and developments in the discussion boards, and should set aside dedicated periods of time three or four times a week for doing the readings and making your own contributions to the work of the class.

Although the course is designed to be flexible, **you will need to keep up with the week-by-week structure** in order to take part in the group activities.

Participation etiquette

Each week, we have a number of questions provided and they require each student to share their reflection on the discussion boards in order to discuss their understanding and ideas with others in the class. You are expected to contribute to the discussions of the reflections of **at least five your peers** each week. Ideally, each week, you would change some of the peers on whose reflections you will comment. In addition, Assignments 2 and 3 also require participation and are essential for provision of formative peer feedback. When taking part in the **Moodle discussion forums**, please apply the basic rules of netiquette:

— Make contributions to the point and try to build on the course readings, research literature, and contributions of your peers.
— Keep contestation polite.
— Try to make sure others' contributions are answered, though this doesn't mean everyone has to answer everyone else!
— Don't worry about structure or typos, but do make yourself clear.

Our main aim should be to move the discussion forward in a positive way.

Pedagogically, the course builds on the principles of the community of inquiry model (https://coi.athabascau.ca/coi-model/). To increase the quality of participation and increase the level of cognitive presence, the discussions are guided by the instructional scaffold reflected on in the grading criteria for participation for Assignments 2 and 3. Details about the instructional scaffold and its effectiveness can be found in the following publication:

Gašević, D., Adesope, O., Joksimović, S., & Kovanović, V. (2015). Externally-facilitated regulation scaffolding and role assignment to develop cognitive presence in asynchronous online discussions. *The Internet and Higher Education, 24*, 53-65.

Networking and connecting
As well as using different digital spaces for formal course discussions, we would strongly encourage you to make connections informally. Skype and Twitter have proved useful for students on the course in networking, after class discussions, debriefs and the occasional 'wee blether' (a random chat about nothing in particular). Guidance on setting up accounts for these technologies is in the *Technologies Handbook*, available at
https://www.wiki.ed.ac.uk/display/mscdetech/

Computer skills and equipment you need
As with other courses on this programme, you are expected to have good access to an internet-enabled computer and browser capable of delivering the VLE Moodle and any other applications you wish to use this during the course.

Course readings will be delivered electronically.

Course structure and format
Learning analytics: process and theory runs over 12 weeks, or one semester, from Monday 17th of September until Sunday 9th of December 2018. A week of study on this course includes the weekend, i.e. each week of work runs from Monday to Sunday.

The course can be usefully divided into four broad themes: foundations of learning analytics; analysis methods of learning analytics; learning analytics tools; and theory and practice of learning analytics.

Foundations of Learning Analytics (Weeks 1-2)

Introduction of technologies into education affords for novel ways to collect data about learning. This comes from the fact that any interaction with technology may result in creation of digital traces. How and what digital traces are collected is typically determined by research questions that are informed by educational psychology, learning sciences and educational policy. These digital traces can then be analysed with methods from the fields such as machine learning, data mining, and social network analysis. The results of such analyses are eventually translated into feedback for different stakeholders involved into the educational process – e.g., students, instructors, administrators, and parents. Presentation of these results is typically created by building on the principles borrowed from disciplines such as human computer interaction, information visualisation, and educational psychology.

In the first weeks, we will focus on main foundations the field of learning analytics builds on and relates to. We will start our journey in week 1 with the insights in the field of learning analytics and its main tasks, applications, methods, and tools. In week 2, we will explore the sister field of educational data mining and offer opportunities to understand similarities and connections between learning analytics and educational data mining.

Week 1: Learning Analytics
Learning analytics emerged as a distinct new field slightly after educational data mining. In this week, we will review some of the main themes, questions, methods, and characteristics of learning analytics. Learning analytics strongly emphasizes the importance of educational theory, practice, and policy as a way to make use of computational methods to improve the understanding of learning and optimize learning and the environments in which learning happens. In this week, we will also look at the linkages between the two sister fields – educational data mining and learning analytics.

Week 2: Educational Data Mining
Educational data mining (EDM) emerged in mid 2000s as a distinct field primarily building on the previous work of the research communities dedicated to the themes of artificial intelligence in education, intelligent tutoring systems, data mining, and educational psychology. Educational data mining has a strong focus on the development of novel methods (mainly computational) that can advance the understating of learning. In this week, we review two important survey reports of the progress and the types of questions and topics commonly looked at in the field of educational data mining.

Learning Analytics Methods (Weeks 3 and 5)

The diverse background of learning analytics also indicates that many different methods for data analysis are used. These methods draw their foundations from areas such as statistics, machine learning, graph theory, and natural language processing. In this section, we will study two popular methods in learning analytics – social network analysis (Weeks 3-4) and epistemic network analysis (Week 5-6). The work in this section will also include several hands-on activities. Datasets used in these activities will be provided in the course content.

Week 3: Social Network Analysis
Social network analysis is one of the most popular methods in learning analytics. It comes from a strong tradition of sociology where the structural effects of social ties are studied. We will first introduce the basics of social network analysis including the main principles, types of data sources that can be used for

extraction of social networks, and several analysis methods. This week will also introduce a popular tool for social network analysis and discuss applications of social network analysis in learning analytics. The work on social network analysis also include several hands-on activities with the tool for social network analysis.

Week 5: Epistemic Network Analysis
Epistemic network analysis is an operationalization of the learning science theory of epistemic frames. It looks at expertise in complex domains not as a set of isolated skills and knowledge, but as a network of connections among knowledge, skills, values, and decision-making processes. Epistemic network analysis makes use of categories of action, cognition, communication, and other relevant features of learning that can be characterised with appropriate coding schemes used for coding discourse. Epistemic network analysis is closely related to the emerging method of quantitative ethnography and represents a nice bridge between qualitative and quantitative research methods. The section will introduce epistemic network analysis, ways to prepare data for analysis, and main methods for data analysis. The work on epistemic network analysis will also include several hands-on activities with a tool for epistemic network analysis.

Learning Analytics Tools (Week 7)

There have been many different learning analytics tools proposed and implemented in practice. This section will introduce three specific learning analytics tools – Loop, OnTask, and LARC. The work on this section will be a combination of readings about the three tools, practical use of the three tools, and reflections on lessons learned using the three tools.

Week 7: Student and Teacher Facing Learning Analytics Tools
This week will provide readings and access to three different learning analytics tools. First, we will analyse the teacher-facing Loop tool that uses learning analytics to explore the connection between students' activities and original pedagogical intents. Second, we will explore the OnTask tool that aims to support teachers in providing scalable personalized feedback to students based on learning analytics results. Finally, we will investigate LARC, a student facing tool that provides a new way of presenting report cards based on learning analytics.

Theory and Practice of Learning Analytics (Weeks 9-10, and 12)

The concluding part of the course is dedicated to specific practical and theoretical considerations of learning analytics. To enable the adoption of learning analytics by a wide range of users, it is essential to develop policies and strategies that will guide the use. Following an examination of learning analytics practices, polices and strategies, the focus will be on the importance of learning and educational theory in learning analytics. The section will conclude by exploring different approaches to deal with ethical and privacy protection challenges in learning analytics.

Week 9: Influential Practice and Policy
Learning analytics has received much attention from different stakeholders including teachers, students, researchers, decision and policy makers, and technology vendors. In spite of this growing attention, the challenge of systemic adoption of analytics in institutions is omnipresent. In this week, we will review existing efforts dedicated to enabling the systemic adoption of learning analytics. As part of these efforts, the development of institutional policies and strategies is essential.

Week 10: Theories Shaping Learning Analytics

Learning analytics should never be disconnected from what we already know about education and learning. Rather, learning analytics should be informed and driven by existing theoretical foundations established in the literature. Moreover, learning analytics should be used as a driver for the development of new theories about learning and education. Learning analytics also needs to develop its own theories. In this week, we will examine some of the existing studies showing the importance of theory-informed learning analytics. We will also investigate some of the existing attempts to develop theoretical foundations for learning analytics to support the design of pedagogical interventions.

Week 12: Privacy and Ethics in Learning Analytics

The use of learning analytics may pose some challenges related to privacy protection and ethics. In the last week of the course, we will discuss some of the challenges and review existing approaches to dealing with these challenges. Special attention will be paid to ethical and privacy protection frameworks that can guide practitioners, decision makers, and researchers interesting in their adoption of learning analytics.

Work on Assignments (Weeks 4, 6, 8, and 11)

Weeks 4, 6, 8, and 11 are exclusively dedicated for the work on the course assignments and do not have any required readings.

Assessment

The assessment consists of three assignments:

  i)   critical literature review paper[1] (35%),
  ii)   collaborative formulation of research proposal (20%), and
  iii)   learning analytics planning paper (40%).

In addition the three assignments, the assessment will also include participation in asynchronous online discussions of weekly reflections through the entire duration of the course (5%).

Assignment 1. Critical literature review paper[1]

The goal in this assignment is to write a literature review paper (1,500 words) on a learning analytics topic. This assignment will help the students define a problem they will be pursuing in assignments 2 and 3.

a) Purpose

It is important to note that the purpose of this assignment is to review the current literature on a selected topic. You are expected to describe the major trends in a selected area, elaborate on several important solutions to past challenges, and identify the major challenges to be addressed in the future. When describing the challenges that researchers and practitioners will face, you need to

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[1] The course will offer an alternative option of this assignment to students in course. The alternative will allow students to base their assignment on the use of social network analysis and epistemic network analysis. The alternative assignment will be based on the datasets that will be provided by the course content. The course instructors will equally value either of the two options standard options (literature review or data analysis) for Assignment 1. The alternative assignment that involves working with social network analysis and epistemic network analysis is available on the Moodle site of the course. Estimated workload for both options for Assignment 1 is the same.

critically analyse the current theories, processes, and methodologies, and identify promising directions that future research could take.

b) Selecting your Topic

Each student is responsible for selecting their own topic, and submitting a proposal to the course instructor before the end of Week 4. The proposal should have up to 2 sentences and only indicate a broad idea[2]. The research paper should focus solely on the topics covered in the course. If the course instructor does not approve your topic, or suggests that you improve your ideas, your date of submission will be recorded when you re-submit your proposal.

c) Format

All papers should be formatted according to the Harvard referencing style (see Programme Handbook) and should not be longer than 1,500 words (author information, title, abstract, and the list of references are excluded from the 1,500 word limit).

The absolute minimum/maximum for the literature review paper is +/-10%. So for the assignment literature review, the minimum is 1,350 and the maximum is 1,650. However, this is *not* an invitation to write 1,650 words for the assignment! Aim for as close to the 1,500 limit as possible, but don't worry if you go a little over or under – that's the purpose of the margin. The word count does not include the list of references.

Please state the word count somewhere in your assignment. Those going over or under the 10% margin will be considered not to have met the requirements for the assignments, and mark penalties are therefore very likely to result. Similarly, those going over the upper word limit will have mark penalties (5% for each 150 words over the upper word limit).

d) Writing your Review Paper

Each paper also needs to include a number of sections between the Introduction and Research Problem Formulation, where you will analyse the topic of your review. Use the following list as a guide to writing this part of your paper.

- An overview of the major challenge(s) faced in this area of research and/or practice;
- A review of the approaches and studies used in the past to overcome these challenges;
  - o For each approach: discuss the problem(s) it addresses, methods used, theoretical foundation, the results of this approach, and any unresolved issues and study limitations.
- A summary of the status of the field;
- A description of the challenges for future research.

e) The Literature Reviewed

Your review should usually cite 6-10 peer-reviewed articles. Every article you use needs to appear in the reference section, and be formatted according to the Harvard reference citation style. A paper can not appear in the reference section if it is not explicitly cited in the main body of the paper. Remember that citations are not usually cited in the abstract. Depending on the topic of your paper, you may need to refer to other publications (journals and conference proceedings)

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[2] Students who decide to follow the alternative option of Assignment 1 are requested to notify the course instructors by the end of Week 3.

that are not listed in the course readings, even though the weekly course readings should be used as the primary source.

f) Submitting your Paper

Completed papers should be submitted in the PDF format to before the end of Week 6 to the Moodle assignment Drop Box. You are welcome (completely optional) to share the assignment submission with your peers via the Moodle discussion board specifically created for sharing and discussing Assignment 1 during Week 7. You are also welcome (completely optional) to provide feedback to at least two of your peers on their assignments.

g) Grading criteria

1. Factual correctness, completeness of the answer, and accurate formatting and style of writing: 30%

All comments and statements in the papers need to be factually sound, backed up by research and implementation results from reliable sources, and provide an adequate review of the domain under study. This criterion also includes clear explanations of ideas and analyses from the literature. Personal interpretations of definitions can be used, but only if they are proven through a methodological research process. Ungrounded definitions of well-defined concepts will lead to significant mark deduction. Most importantly, students need to demonstrate a level of mastery of the concepts of the state-of-the-art in learning analytics process and theory; precisely define the problems under study; accurately connect them to possible solutions from the literature; and demonstrate an accurate and critical use of the research literature. Weaknesses observed in factual soundness have direct negative implications on synthesis/critical analysis and methodology criteria listed below.

2. Synthesis and critical analysis of the topic: 40%.

A synthesis of the topics discovered and learned from the literature is expected. Only short quotes of the definitions are acceptable. Long quotes of someone else's analysis are not considered to be an indication of synthesis and critical discussion of the topics analysed, as they do not demonstrate the knowledge and understanding of the students of this course. The ability to find a relevant source is an important auxiliary step toward one's own synthesis of the knowledge learned from different sources, which is the primary objective of this course. Each paper needs to discuss limitations of phenomena under study; relevance of the phenomena, with respect to related work from the literature; a discussion of the alternatives to the proposed approach; and the reasons for selecting that approach. Students are also expected to draw conclusions from the synthesis of the various topics learned from the literature review; to show how these conclusions are innovative and have not been specified in the literature; and to prove that they are scientifically and/or methodologically valid.

3. Methodological explanation of the concepts: 30%

Students are expected to present explicit and sound justifications for the decisions to include certain concepts in the discussion, as otherwise the report will be methodologically unsound. A strong justification for the organization of the paper, and a methodologically grounded explanation of the steps taken in the process of the literature review (e.g., what sources were used, why those sources were selected, and what selection criteria were followed), needs to be seen very explicitly in the paper.

Late Submissions. Late submissions are not permitted and extensions will be made in exceptional circumstances only (e.g., health related problems).

Assignment 2. Collaborative formulation of application or research proposal

The goal of this assignment is to help students formulate their proposals for the development of implementation or research plans in Assignment 3 and discuss their research proposals with the peers. Students will provide constructive feedback to their peers about their proposed research, the quality of which will be assessed and contribute to the final mark.

A research proposal of 500 words will be written by each student, which will be shared in the course space for peer feedback. All students will be expected both to provide feedback, and to respond constructively to feedback from others. The participation in the discussions about peers' proposals will constitute 20% of the assessment weighting for Assignment 2.

There are two main tasks for this assignment:
- Application/research proposal (80% of the Assignment 2 mark)
- Responses to the posts of your peers on your plan and participation in the discussions of your peers' plans (20% of the Assignment 2 mark)

a) Proposal submission scheduling

Each student is expected to submit their implementation/research proposal in the form of a message submitted to the course discussion forum. Plans will be submitted at the end of week 8 and discussed during week 9. Note that there is no guarantee that the submission date you have selected will be accepted, as priority will be given to those students who first submit their preferred weeks before the end of Week 4. Therefore, it is to your advantage to submit your plan to the course instructor as early as possible. On the other hand, if the course instructor does not approve your topic, or suggests that you work to improve your ideas, your date of submission will be recorded when you re-submit your plan.

b) Proposal content

The content of this assignment is a natural extension of your work done in the Assignment 1 paper. Your Assignment 2 post is expected to have the following elements.

1) *Title (at most 15 words)*. The title of your proposal to be detailed in Assessment 3.

2) *Abstract (75 words).* The abstract answers the following questions: What is the problem under study? Are there other relevant solutions, and what do they fail to address (i.e., what is the motivation to study this problem)? What is your proposed approach to the problem under study? How do you plan to methodologically approach and validate the proposed approach? What are the expected results and contributions of your project?

3) *Literature review summary (100 words).* This section summarizes the main points from the relevant literature review. In this summary, you are welcome to summarize the findings presented in your Assignment 1 paper. The section is expected to cite most of the relevant references and establish explicitly how those

studied references (and their findings) are of relevance for your proposal. It is expected to cite at least eight (8) references in your proposals.

4) *Methodology (400 words).* A brief outline of the methodology explains the elements of the proposed approach. In addition, this section (in no longer than 100 words) should discuss any concerns and anticipated challenges to be experienced while performing this project.

5) *List of references (no word limit).* Please use the same formatting as used in Assessment 1.

c) Format

All proposals should not be longer than 500 (author information, title, abstract, and the list of references are excluded from the 500 word limit).

The absolute minimum/maximum for the proposal text is +/-15%. So for the proposal text, the minimum is 425 and the maximum is 575. However, this is *not* an invitation to write 575 words for the assignment! Aim for as close to the 500 limit as possible, but don't worry if you go a little over or under – that's the purpose of the margin. List of references is not included in to the word count.

Please state the word count somewhere in your assignment. Those going over or under the 15% margin will be considered not to have met the requirements for the assignments, and mark penalties are therefore very likely to result. Similarly, those going over the upper word limit will have mark penalties (5% for each 50 words over the upper word limit).

A note on (self-)plagiarism: As the assignments build up, you may find you want to refer to your own earlier work. It is important to reference your own previous work as you would anyone else's, paraphrasing where appropriate and enclosing exact quotes in quotation marks only if necessary. If you are concerned about this, do get in touch or post on the discussion forum – it raises interesting issues!

d) Where to Submit

Submit your proposal to the Assignment 2 discussion forum associated with week 9). Each student is expected to submit their plan in a new thread of the forum where the title of the thread is the title of the implementation/research plan.

e) Late Submissions

Given the cooperative nature of the course, late submissions are not permitted. A timely submission will give your peers the opportunity to participate in the discussion of your plan's posts. Any requests for extensions will not be considered if received later than five (5) days prior to your submission deadline (with exceptions of extension requests due to reasons such as health related problems and disability). Without prior approval, the final Assignment 2 mark for late submissions will be deducted by 5% for each day of the delay.

f) Grading criteria

Proposal submission (80% of the Assignment 2 mark)

The plan will be marked according to the three marking criteria provided in Assignment 1.

Responses to the posts of your peers on your plan and participation in the discussions of your peer submissions (20% of the Assignment 2 mark).

All students are expected to provide prompt answers to posts from their peers, and to moderate the discussions initiated by their proposal posts. It is highly unfavourable if some posts of the peers remain unanswered (posted during the proposal presentation period even until the end of week 8) and might lead to mark deductions for participation.

For the participation mark of Assignment 2, you are also expected to participate actively in the posts made by your peers and contributions to the discussions of **at least two of your peer proposals' during week 9**. When submitting a response to one of the peer reflections, please, priority should be given to those who have not received responses from <u>at least two other colleagues in the course</u>. In this way, we want to have equitable opportunities in discussions for all the students in the course.

Participation in a peer's presentations will not be considered just by posting a general comment (e.g., "how great the presentation was"). Your participation is expected to be about the content presented with the following four levels (from the lowest to the highest quality):

1. *clarification question* – asking about some uncertain parts of a proposal submitted or sense of puzzlement about more general ideas associated with the topic of the proposal;
2. *exploration post*– brainstorming about some possible ideas or sharing information about the topic of a proposal at hand, another peer-reviewed paper for the course readings, or discussion post of another peer;
3. *integration post*–proposing a novel research topic by making use of the results presented in the previous discussions at hand to draw ideas that are formulating a hypothesis or an approach how to solve a problem. Preferably, the result of a discussion triggered by such a post might result even in the problem formulation of the enhance existing and formulate new ideas to be pursued in the final assignment of the course.
4. *resolution post* – exploring conditions under which certain hypothesis may be valid and identification of the limitations in proposed solutions and methods by building on the literature and professional experience/practice supported with reliable citations. Typically, resolution posts build on integration posts, but other categories of posts are possible as well.

Ideally, the aim is to have some of the posts on higher levels of quality as defined above. <u>It is NOT recommended to write in discussion posts which level of quality the posts are on based on the above four categories.</u> The point is to have as natural discussion as possible and the above standards are to encourage deep conversations about the subjects discussed.

Assignment 3. Learning analytics planning paper

This assignment is the development of a detailed plan for the implementation or research in learning analytics. This assignment builds on the problem formulated and developed in Assignment 2.

Students will write a research paper of 2,500 words which will constitute 65% of the assignment weighting; they also give an online presentation of their work

which will constitute the 25% of this assignment weighting. Students will provide constructive feedback to their peers about their proposed work, the quality of which will be assessed and contribute 10% of the assessment weighting for assignment 3.

a) Timeline

The due date for submission of the deliverables for Assignment 3 is by the end of week 11 of the course.

b) Elements of the Research/Implementation Plan

With the proposal defined in Assignment 2, you are expected to start developing a detailed plan for your research or implementation project. The following components are expected to be included to fully address the problem under study.

1. Define the implementation/research approach proposed. This approach should explain what the main implementation/research challenges are in the problem under study. Having those issues precisely defined, you need to explain in detail the research approach you are going to take, including:

   a) A set of methodological steps that are going to be taken in your project. For each step, explain why it is needed, how it contributes to the proposed solution by addressing the defined problem, what alternatives are possible for that particular step, and why it was selected.

   b) An evaluation framework to be used in your approach, and why that evaluation is suitable for your problem.

2. Describe the activities you plan to undertake in each of the steps in the previous bulleted point. This means that you are expected to explain each of those steps in detail, and completely explain your approach. Include the following elements, for each component of your research approach.

   a) A complete definition of each of the components of the proposed approach to the studied problem.

   b) Describe the framework, instruments, and sources used for data collection.

   c) Describe the evaluation framework along with measures planned to be used for evaluation, and an explanation of the processing strategy for the collected data in 2b. Explain the proposed approach in detail your evaluation approach (e.g., using diagrams), critically analyse its pros and cons, and formulate implementation and/or research questions for future work.

3. Compare your implementation/research plans to other relevant results in the area. This should build on your literature review from Assignments 1 and 2, and compare the research contributions of your proposal to the results available in the literature. This could, for example, be a tabular comparison of your work with other results (e.g., rows are different approaches and columns are features/characteristics of the problem being studied for each of the features analysed). This needs to be done in a methodological way.

4. Conclude with a summary of your methodology, an explanation of how your plan can be applied, and a description of open implementation or research challenges and activities to be done in future work (e.g., by comparing your work to the literature, and evaluating the results).

c) Deliverables

Project paper (65% of the assignment weighting). All papers should be formatted according to the Harvard referencing style (see Programme Handbook) and should not be longer than 2,500 words (author information, title, abstract, and the list of references are excluded from the 2,500 word limit).

The absolute minimum/maximum for the paper is +/-10%. So for the paper, the minimum is 2,250 and the maximum is 2,750. However, this is *not* an invitation to write 2,750 words for the assignment! Aim for as close to the 2,750 limit as possible, but don't worry if you go a little over or under – that's the purpose of the margin. The list of references is not counted in the word count.

Please state the word count somewhere in your assignment. Those going over or under the 10% margin will be considered not to have met the requirements for the assignments, and mark penalties are therefore very likely to result. Similarly, those going over the upper word limit will have mark penalties (5% for each 100 words over the upper word limit).

A note on (self-)plagiarism: As the assignments build up, you may find you want to refer to your own earlier work. It is important to reference your own previous work as you would anyone else's, paraphrasing where appropriate and enclosing exact quotes in quotation marks only if necessary. If you are concerned about this, do get in touch or post on the discussion forum – it raises interesting issues!

Presentation (25% of the assignment weighting). Create a presentation of your work by including all the items from your paper. Each presentation is expected to be 20 minutes long. If a presentation is longer that this limit, this will affect your mark in the following manner: each minute longer decreases 5% of your mark of the presentation. However, the presentation can not be shorter than 17 minutes, as the same rule will be applied to all shorter presentations as well.

The course is only offered online and as such it is accessible to the students from many different time zones. This makes setting up synchronous presentations very hard to include all the students in the course. However, the goal of any presentation is not only to be presented, but rather to introduce some important concepts and engage the audience into the discussion. Therefore, the presentations in this course are given asynchronously in a "YouTube-like" style. That is, you should upload the video recordings of your presentation to the university-hosted Kaltura asset media system, so that others can accessed it as streamed video. Then, you should embed a link to your presentation recording to the discussion form for Week 12.

d) Submission

Both the presentation and the research paper have to be submitted by the end of Week 11 of the course. This will provide your peers with the opportunity to watch to your presentation, ask questions, and further discuss the research challenges related to your research during the last week of the course.

Late Submissions and Technical Problems. Given the collaborative nature of the course, late submissions are not permitted. A timely submission will give your peers the opportunity to participate in the discussion of your presentation. Extensions will be made in exceptional circumstances only (e.g., health related problems).

You need to test the presentation recording and submission to Kaltura on time, but no later than at least five days before your presentation submission deadline. This will help you detect all possible problems you might experience. Reports about technical problems with the submission reported on the day of submission without providing evidence about timely conducted tests with the technology and reported problems (i.e., at least five days in advance) will consequently lead to the same mark deductions as with any other late submissions (i.e., 5% deduction for each day of the delay).

Presentation. Please first upload your presentation to Kaltura. Then, submit your presentation to the Assignment 3 discussion forum; each student expected to submit their presentation in a new thread on the forum for presentation discussions in Week 12. In your thread, please include the URL to your presentation or embed the video to the post, along with the title and abstract of your paper.

Paper. Papers need to be submitted via the Moodle Assignment Drop Box by the end of Week 11. You are also strongly encouraged to submit your paper to the Assignment 3 forum as an attachment to your post about the presentation. This will help your peers obtain more details about your research project, better articulate their questions, and better substantiate their feedback.

Participation. Once you have submitted your presentation, you are responsible for promptly responding to the questions your peers will post to the thread related to your presentation. You are also expected to participate in the discussions related to the presentations submitted by other students, as this will your final grade.

e) Grading criteria
Paper (65% of the Assignment 3 mark)

The plan will be marked according to the three marking criteria provided in Assignment 1.

Presentation (25% of the Assignment 3 mark)

Presentations will be graded according to the following marking criteria:
- Reference citation and formatting: 5%
- Structure and clarity: 30%
- Content: 25%
- Critical analysis of the presented work, and its relation to related work: 25%

Responses to the posts of your peers on your plan and participation in the discussions of your peer submissions (10% of the Assignment 3 mark).

All students are expected to provide prompt answers to posts from their peers, and to moderate the discussions initiated by their presentations and papers. It is highly unfavourable if some posts of the peers remain unanswered (posted during week 12) and might lead to mark deductions for participation.

For the participation mark of Assignment 3, all students are expected to participate actively in the presentations made by your peers. Each student is expected to contribute to the discussions of **at least three of your peer presentations during Week 12**. When submitting a response to one of the peer reflections, please, priority should be given to those who have not received responses from <u>at least three other colleagues in the course</u>. In this way, we want to have equitable opportunities in discussions for all the students in the course. Participation in a peer's presentations will not be considered just by posting a general comment (e.g., "how great the presentation was"). Your participation is expected to be about the content presented with the following four levels (from the lowest to the highest quality):

1. *clarification question* – asking about some uncertain parts of the presentation or paper submitted or sense of puzzlement about more general ideas associated with the topic of the paper or presentation;
2. exploration post– brainstorming about some possible ideas or sharing information about the topic of a presentation/paper at hand, your and some other peer's presentation/paper, another peer-reviewed paper for the course readings, or discussion post of another peer;
3. *integration post*–proposing a novel research topic by making use of the results presented in the previous discussions to generate new ideas that are formulating a hypothesis or an approach how to solve a problem. Preferably, the result of a discussion triggered by such a post might result even in the problem formulation of the research to be done in the future or help to resolve some issues in your or your peers' implementation/research plans.
4. *resolution post* – exploring conditions under which certain hypothesis may way, identification of the limitations in proposed solutions and methods, and justification based on the literature and professional experience and practice supported with reliable citations. Typically, resolution posts build on the integration posts.

Ideally, the aim is to have some of the posts on higher levels of quality as defined above. <u>It is NOT recommended to write in discussion posts which level of quality the posts are on based on the above four categories.</u> The point is to have as natural discussion as possible and the above standards are to encourage deep conversations about the subjects discussed.

Reflections

Students will write reflections on the course readings and critically evaluate each other's reflections, which will constitute the final 5% of the course grade. There will be two reflections with the following subjects and submission dates:
- reflection on readings from weeks 1 and 2 to be submitted at the end of week 2 and discussed during week 3
- reflections on readings from week 7 and experience gained using the three learning analytics tools to be submitted at the end of week 7 and discussed during week 8

Each reflection assignment should contain the following components:

- summary of the main lessons learned from the subject of the discussion;
- description of major points learned from the course activities related to the subject of the reflection;
- outline of major points that are most relevant for the student's personal interests, work, and/or practice;
- summary of the main points of confusion faced by the student (if any).

Consistent with the literature in online education, the purpose of this assignment is to receive formative feedback from both peers and the instructors and encourage social knowledge construction activities that will contribute to the three assessments in the course.

Reflections and participation in the discussions contribute 5% towards the final grade. Each reflection is expected to be at the level of integration (definition is provided below). In addition to responding to the comments on their own weekly reflections, each student is expected to participate in the discussions of at least two other peers' reflections each week. When submitting a response to one of the peer reflections, please, priority should be given to those who have not received responses from at least two other colleagues. In this way, we want to have equitable opportunities in discussions for all the students in the course.

Participation in a peer's presentations will not be considered just by posting a general comment (e.g., "how great the reflection was"). Participation in discussions about the reflections is expected to be at the following four levels (from the lowest to the highest quality):

1. *clarification question* – asking about some uncertain parts of the weekly reflection submitted or sense of puzzlement about more general ideas associated with the topics of the course;
2. exploration post– brainstorming about some possible ideas or sharing information about the topic of a weekly reflection at hand, your and some other peer's weekly reflection, another peer-reviewed paper for the course readings, or discussion post of another peer;
3. *integration post*–proposing a novel research topic by making use of the results presented in the previous discussions to generate new ideas that are formulating a hypothesis or an approach how to solve a problem. Preferably, the result of a discussion triggered by such a post might result even in the problem formulation of the research to be done in the future or help to resolve some issues in your or your peers' implementation/research plans.
4. *resolution post* – exploring conditions under which certain hypothesis may way, identification of the limitations in proposed solutions and methods, and justification based on the literature and professional experience and practice supported with reliable citations. Typically, resolution posts build on the integration posts.

Ideally, the aim is to have some of the posts on higher levels of quality as defined above. It is NOT recommended to write in discussion posts which level of quality the posts are on based on the above four categories. The point is to have as natural discussion as possible and the above standards are to encourage deep conversations about the subjects discussed.

Submission dates

Assignment 1 submission - by **Sunday 28 October 2018** – to the Moodle assignment drop box. You will receive the instructor's feedback on your Assignment 1 by **Monday 5 November 2018**.

Assignment 2 proposal discussion post – by **Sunday 11 November 2018** – to the discussion forum dedicated to Assignment 2. You will receive peer feedback on your proposal during Week 9 of the course, and instructor's feedback by **Monday 19 November, 2018**.

Assignment 3 paper and presentation– by **Sunday 2 December 2018** – to the Moodle assignment drop box (paper), Media Hopper (presentation recording), and discussion forum (paper and link to the presentation). You will receive peer feedback on your Assignment 3 paper and presentation during Weeks 12 of the course. You will receive the instructor's feedback and your provisional mark for the course within 15 working days.

The postgraduate common marking scheme

Grades will be awarded in line with the University's postgraduate common marking scheme:

Mark (%)	Grade	Description
90-100	A1	An excellent performance, satisfactory for a distinction
80-89	A2	An excellent performance, satisfactory for a distinction
70 – 79	A3	An excellent performance, satisfactory for a distinction
60 – 69	B	A very good performance
50 – 59	C	A good performance, satisfactory for a masters degree
40 -49*	D	A satisfactory performance for the diploma, but inadequate for a masters degree
30-39**	E	Marginal fail
20-29	F	Clear fail
10-19	G	Bad fail
0-9	H	Bad fail

The pass mark is grade D (40%).

For more detail on the regulations which govern the course and the programme you should consult your Programme Handbook and the University's Degree Regulations and Programmes of Study (DRPS) which are to be found on the Web at: http://www.drps.ed.ac.uk/

In particular, the regulations governing taught postgraduate programmes are included at: http://www.drps.ed.ac.uk/17-18/regulations/postgrad.php

Credit and continuation of study

Successful completion of this course will give you 20 Scottish Credit and Qualifications Framework (SCQF) points at postgraduate level 11. More details of the SCQF can be found on the Web at: http://www.scqf.org.uk/

The full MSc in Digital Education will comprise one foundation course and four additional 20 credit courses, plus a dissertation. The list of options is available on the programme web site at: http://digital.education@ed.ac.uk

The regulations governing satisfactory progress for continuation to Masters level by submission of a dissertation are given in your Programme Handbook.

Readings

You are not required to purchase any books for this course. All essential readings are provided, in electronic form, in the relevant areas of course content. Some of the core readings are provided through e-reserve, which means that they have been copyright-cleared specifically for this course, and are available to download in pdf format from the course site. A few others are openly available on the web. The majority are in the form of links to e-books and e-journals which you should be able to access if you are signed into EASE.

E-books are presented in various ways by different publishers. If you are asked for your Shibboleth link, this means finding the University of Edinburgh in the drop down list provided. See the Library for more information on access to e-books. If you do not get a good result from your link to e-books in the Library, you might want to try changing your browser. If there seems to be a problem, though, do let us know.

Formative feedback/feedforward

The course has been designed to include opportunities for formative feedback on participation and planning for assignments. The tutor comments on the smaller assignment – reflection on the learning event – act as feedforward for the final assignment, and there is a rapid turnaround of this feedback, which you will receive a few days before you get the provisional grade for the assignment.

Course co-ordinator contact information

Do contact Yi-Shan and Dragan if you have any questions or concerns about the course.

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