DOSSIER OF

UNIVERSITY TEACHING QUALIFICATION (UTQ)

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II/INSY/EEMCS, TU Delft

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University Teaching Qualification:

UTQ Final Proof of Competence

Participant:	**Pradeep K. Murukannaiah**	Faculty:	**EEMCS**

Part 1: Evaluating Teaching

1. Conducting purposeful course evaluations

In the last academic year (2021-2022), I was involved in teaching two courses. In one of these courses, I was the course coordinator (responsible instructor).

1.1 Purpose of the evaluation

In the courses I teach, we include three types of evaluations: (1) a mid-quarter evaluation with student panel, (2) an end-quarter online survey, open to all students, and (3) an in-class discussion and feedback session on the course during the last lecture. The main purposes of these evaluations are to continually improve the course and to improve myself as a teacher.

About the course, the evaluations give insights in the interestingness, relevance, usefulness, and the difficulty of the topics covered in the course as well as the assessments (e.g., exam questions) used. Understanding each of these four aspects (interestingness, relevance, usefulness, and difficulty) is important for making the course more effective.

About the instructor, the evaluations give information on clarity of communication, course organization, and in general, what students expect from the instructor. This information is useful to improve as an instructor. Sometime, this information is also useful to set the right expectations in the future editions of the course.

Evaluation approaches and methods

The three forms of evaluations used in my courses provide complimentary information.

In the mid-quarter evaluation, we receive general feedback about the course, positive aspects, and areas for improvement. This evaluation gives real-time feedback during the course. Thus, this evaluation helps me understand the specific problems students in the current cohort may have and address those in the current edition of the course.

The end-quarter survey gives more detailed information on the course and the instructor. The information includes (1) the attendance of the students, (2) feedback on the tools used in the course, (3) feedback on the studyguide, (4) structure of the course, (5) study load, (6) relevance and usefulness of the course contents, (7) assignments and exams, and (8) teaching assistants. In addition, we get general information on the overall positive aspects of the course and the areas for improvement. This information is quite valuable in understanding the students' perception of the course as a whole and making improvements for the future editions of the course.

Finally, the in-class session provides an opportunity to elicit feedback in person, face to face. In this session, we discuss the topics covered in the course and mention related topics not covered in the course. We ask students suggestions on additional topics to include and current topics to drop in the future editions. This is an open-ended discussion and gives a good insight on what aspects of the course students enjoy and find useful.

2. Analysis of evaluation results

I am analyzing the evaluation results of Collaborative Artificial Intelligence (2020-2021), a course for which I am the responsible instructor. At the end of this section of the PoC, I am including the EvaSys report about the evaluation of the course.

2.1 Draw conclusions

Based on the evaluation results, I drew the following conclusions.

- We are happy with the positive response to the course in its first edition. We thank the students for their active participation and encouraging comments.
- One major comment about the course is about the second assignment, especially the second phase of it, where student teams had to collaborate with each other. As some students understood, such a collaboration is necessary in developing real collaborative AI applications and our goal is to introduce students to this way of thinking and working. In any case, we will consider redesigning this phase to make the collaboration as smooth as possible.
- Some students mentioned that the end-term exam was easy for a 3rd year exam. The exam being open book may have contributed to this perception. However, considering that the mean grade in the exam is 7.4 (median 7.6), the exam may have not been easy for all students. We will consider this factor in designing the exam in the next edition.
- Some students mentioned that the frameworks used in the practical assignments are not well documented. We agree with this. This course covers emerging topics and some frameworks used in the course are under active development. Also, this was our first experience with some of these frameworks. We expect these assignments to be smoother in the next edition since we have better experience with the underlying frameworks now.
- Students liked the format of our online exam, which included blocks of questions. This way individual questions were not timed but the blocks were.

2.2 Recommendations

Based on the feedback and discussing the feedback with the other instructors of the course, we made the following recommendations.

- Redesign the second phase of the second programming assignment. Specifically, focus on making the collaboration among teams smooth and emphasize that learning to collaborate with heterogeneous teams is an important aspect of developing collaborative AI applications.
- Slightly increase the difficulty of the end-term exam.
- Enhance the documentation of the frameworks used in the programming assignments.

2.3 Previous evaluations and improvements

In line with the recommendations made, we made the following changes to the course in the current (2021-2022) edition of the course.

- Redesigned the second assignment. In the redesigned assignment, the students don't need to depend on the agents provided by other teams, which caused a lot of difficulties in the previous version. Instead, students need to collaborate with other agents that we provide. This way, the students still learn to develop collaborative agents, but do not depend on other teams to complete their assignment.
- We included more challenging questions in the exam this year. Further, the exam format this year was in-person and closed-book (as opposed to an online and open-book exam last year), we expected some questions to be perceived harder this year than the previous year. Based on our analysis of the exam results so far, it seems that the median grade is slightly lower, which is indicative of the increase in difficulty. Yet, there are several students with high grades, which indicates that good students can still do well in the course.
- We enhanced the documentation of the frameworks used in the programming assignments. Further, we also increased the teaching assistant (TA) support for these assignments. We hope that this has helped the students and we look forward to continually improve the documentation.

Part 2: Professionalisation

3. Vision for teaching and learning

3.1 Teaching and learning

Learning computer science (CS) can be both exciting and challenging. Perhaps, a major problem CS students face is information overload. With so much to learn and so much of information (and misinformation) easily available, learning CS concepts, staying in the flow channel (neither getting bored nor panicking), can be extremely difficult.

As a teacher, my key objective is to show students that learning CS is about grasping a relatively few fundamental ideas and principles that underlie a plethora of application-level technologies. For example, in a programming course, my main objective will be to help students learn the art of breaking down a solution to a problem into a set of modules and steps before teaching the syntactic nuances of a specific language.

3.1 Educational vision and teaching

To realize my vision for teaching and learning, I employ the following main strategies.

- First, I incorporate conceptual modeling, an idea I explore in research, in teaching, too. Conceptual modeling advocates that a software (to be implemented) be understood via cognitive concepts, focusing not only on what and how, but importantly on why. Following this intuition, in a data mining class, for example, I will not only describe the algorithmic steps of an approach, but also describe why the approach is designed a certain way.
- Second, balancing theory and practice as an important aspect of teaching CS. I design my courses to educate students on the foundational concepts as well as to train them on using those concepts in concrete applications. This will both develop students' intellect and equip them with the skills their careers demand. I will make sure that the training exercises reinforce, but also be complementary to the material I teach in lectures.
- Third, higher-education institutes are culturally diverse. Whereas diversity enhances students' experience, it makes teaching a challenging task. For example, I believe in engaging students via dialogue during a class. However, some students tend to be shy (some might even consider disagreeing with the instructor as disrespectful). A solution in this case can be to encourage students to first talk to their peers and then to the instructor. I have experienced many such cultural differences, personally. I respect such differences and will do my best to accommodate for them in my classes.
- Fourth, students often do not have a bigger picture of CS careers, e.g., industry vs. academic jobs or development vs. testing in the industry. I am willing to help students understand various career options and prepare accordingly. For example, a student wishing to pursue a development job in the industry must master programming, whereas publishing a paper (or even attempting) can add a great deal of value to a student wishing to pursue a research career.
- Finally, motivation is important for learning. I imagine that a student does well in a subject not just because of dedication, but also because he or she is passionate about the subject. To inspire students in my courses, I demonstrate how the concepts they learn could lead to applications that benefit millions of users. Similarly, in advanced courses, I will invite researchers to present cutting-edge works relevant to the course to inspire students about research careers.

4. Managing education in a teaching team

4.1 My role in the team

As of now (May 2022), I play the following roles across four courses.

1. **Course developer**: Three of the four courses I am involved in are new courses. For each of these course, I (collaborating with co-instructors) developed the course curriculum, which include the topics to be covered, the structure of the course, and the programming assignments. I also identified suitable lecturers for each of the topics covered in the course.
2. **Course coordinator**: In two of the courses I teach, I am the course coordinator. In these courses, I set up the course before the term, make sure that it runs smoothly, and analyze the feedback and suggest improvements at the end of the term. I also hire teaching assistants, assign tasks to those, and supervise their work.
3. **Lecturer**: In all courses I am involved in, I also teach a subset of the topics. In this role, I decide the subtopics, map the subtopics to the learning objectives, prepare learning

activities and materials, deliver the lectures, prepare formative and summative assessment, and provide formative and summative feedback.

4.2 Balancing professional roles

I am a teacher, a researcher, and member of the university and the broader academic community. Each of these roles demand my time.

My main strategy for balancing these roles is to make these activities reinforce each other as much as possible. For example, I teach subjects that I also research on. This way, I am not only an expert teaching a subject, but also learning about the subject continuously. Similarly, as a member of the research community, I expected to peer review scientific papers. I try to do this in such a way that the papers I choose to review not only require my expertise but also contribute toward enhancing my understanding of the subject. Also, within the university I choose service roles that align with my teaching and research responsibilities. For example, I am a member of the management teach for Delft AI Labs program, and this role aligns with my overall research interest in AI.

Further, I try to schedule my time in such a way that I don't have too much context switching. Specifically, I try to schedule most of my teaching in two quarters of the year. This way I focus more on teaching in two quarters and more on research in the other two quarters. Of course, this is not a complete separation, yet this helps in setting overall expectations.

Finally, I am learning that I can seek help in a lot of activities from others. For example, I do not teach something just because I am capable or interested in it. Besides expertise and interest, I also need to have time to teach something. If I don't have the time, I try to find another suitable person for the job. Similarly, I am learning to delegate several simpler tasks of the course (e.g., managing the Brightspace page) to the teaching assistants.

5. Reflecting on professional development

5.1 Personal strengths and weaknesses

I recognize the following key strengths in me as a teacher and a supervisor.

- **Knowledge**: I have a good understanding of the foundations as well as the state-of-the-art of the topics I teach. This helps me in teaching the topic to a range of students. Often, even in the same class there will be students of different entry levels. Knowing both foundations and cutting-edge makes my lectures interesting for both types of students.
- **Professional yet friendly atmosphere**: As a supervisor and teacher, another key strength I have is to maintain a professional yet friendly atmosphere, where students are relaxed and willing to discuss their true preferences and real problems with me.
- **International experience**: Finally, the broad educational experience I have had as a student is also an important strength for me. I studied in India until BSc; I did my MSc and PhD in USA; and now I am teaching in the Netherlands. This international experience, with an understanding of the pros and cons of the different educational settings, has prepared me in understanding the educational needs of students from different backgrounds.

I recognize the following key weaknesses in me as a teacher and a supervisor.

- **Managing others' monkeys on my back**: Sometimes, I tend to manage problems myself. For example, when a student complains that certain tasks are inconvenient or that he/she is bad at it, I tend take that task for me.
- **Time management**: I should learn better time management in my meetings with the students. I often have open-ended discussions with students in my meetings, which are difficult to time. As a result, we won't be able to complete all items on agenda in a meeting.
- **Information overload**: A potential problem with my lectures is that I try to convey too much information. This often results in not having time to cover all topics in detail.
- **Expectations**: Overall, I have high expectations from my students. This is not a problem, but I need to learn better ways to align my expectations with those of the students.

5.2 Further development

I identify areas for further development, which address the weaknesses above.

- **Separation of responsibilities**: I am working on effective ways to separate responsibilities. That is, if a task is a student's responsibility, the student should complete it. If the task is difficult for the student, I should assist the student but should keep the student in the lead. An important aspect of the improvement is learning to effectively set the responsibilities and clearly communicating those. One way I am approaching this is to make clear not only what is a student's task, but why. For example, because of time pressure I can write a particular section of a paper the student is responsible for, but if I do that, the student does not learn to work under time pressure.
- **Planning**: For better time management, I am asking the students to set clear agendas for meetings ahead of time. Then, the student and I can structure the meeting such that important and pressing items are discussed before the open-ended topics.
- **Information management**: For reducing information overload, I am working on reducing the content I deliver in a lecture and making the presented content more interactive and active learning oriented. I can still provide the additional content as homework, assignments, or additional readings for the students to learn at their own pace.
- **Aligning expectations**: To align expectations better, I am striving to set right expectation from the beginning, e.g., for a PhD student it starts from the interviews. Further, I am also learning to better understand what students' expectations are.
- **Balancing feedback and feed-forward**: I often give more input on "where am I going" and "what to do next", and not as much input on "how am I doing." This is mainly because I think that students already know how they are doing. However, I realize that this is not necessarily the case. I am improving on giving more input on "how am I doing."

Part 3: Reflecting on the UTQ trajectory

The most important idea that I learned from the UTQ trajectory was that of **constructive alignment**. Before UTQ, I was familiar with each component of the alignment, i.e., learning objective, learning activities, and assessment. However, I did not often think about the alignment. For example, I would teach something that I find as interesting or useful for students but didn't carefully think if that teaching activity aligns with a stipulated learning objective in the studyguide.

Ignoring this creates a mismatch between what I teach and what students expect to learn from the course, despite both I and the students having good intention. However, after UTQ the constructive alignment is the first thing I think about given any learning objective, activity in the class, or a question in the exam. This has really helped me in designing, teaching, and assessing courses. With this idea I have developed two courses at TU Delft.

One area of improvement I suggest to the UTQ trajectory is to spend more time on supervising students. The SUPERVISE module is intended for that, but I think that one module is not sufficient to cover all the nuances involved in supervision. Perhaps, this could be a series of optional modules. Depending on the topic, interested supervisors can take a specific module. Further, one change I suggest is to also include supervisees (e.g., PhD students) in a SUPERVISE module. Training on how to be supervised is as important as training on how to supervise.

Overall, I am quite happy with my progress in the UTQ trajectory. When I look back, it seems like there isn't anything surprising in the UTQ modules---the concepts are intuitive and I might have already known most of the things introduced in the UTQ modules. That said, I do see differences in the way I teach and mentor before and after UTQ. This, I believe, is because the UTQ modules help you explicitly think about many ideas that you may be familiar with intuitively and this shift makes a difference in the way you approach teaching and mentoring.

My sincere thanks to all the instructors and BKO for offering the UTQ modules!

Education Evaluation Report

Teacher's report

17-05-2022

Collaborative Artificial Intelligence

General

Title	Collaborative Artificial Intelligence
Code	CSE3210
Period	
Year	2020-2021
EC	5.0
Programme	2020/2021 BSc Computer Science and Engineering
Responsible Instructor	Dr. P.K. Murukannaiah
Co-Instructors	Prof.dr. C.M. Jonker Dr. M.L. Tielman
Predecessors	
Successor	CSE3210: Collaborative Artificial Intelligence (2021-2022-Q3)

CSE3210: Collaborative Artificial Intelligence (2020-2021-Q3) - Q3

Statistics

Test Date/Info	Remarks	Registrants	Participants	Passed	Passing	Graded On Time?
Week 4.11	Resit	13	11	10	91%	
Week 3.10	Final grade based on: Written Examination (50%) and Group Assignments (50%)	189	183	177	97%	On time

Survey Data

	Score	Standard Deviation	Histogram
Total number of respondents			7
I attended ....% of the scheduled remote / online educational activities.	1.7 (1 of n Question)		7
If 50% or less, please indicate the main reason why:	3.0 (1 of n Question)	0.0	1
Taking into account the number of ECS for this course (5 EC = 14 hours per week on average), I spent . hours on this course.	2.1 (Scaled Question)	0.4	7
The teacher made use of the following online tools during the course (multiple options possible): Brightspace forum	0.1 (n of m Question)		7

The teacher made use of the following online tools during the course (multiple options possible): Feedback Fruits	0.1 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): Jitsi meet	0.3 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): Mattermost	0.4 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): The Queue	0.6 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): Weblab	0.3 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): Youtube	0.1 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible): Zoom	0.9 (n of m Question)		7
The teacher made use of the following online tools during the course (multiple options possible):			

Other, namely:	0.4 (n of m Question)		7
If Other, please explain briefly:	0.0 (Open Question)	0.0	4
	StackOverflow		
I experienced the following aspects of using these online tools as positive:	0.0 (Open Question)	0.0	2
	Good responsiveness		
I experienced the following aspects of using these online tools as negative:	0.0 (Open Question)	0.0	2
	Mattermost was somewhat redundant.		
Please grade your online education experience for this course (1 = very poor; 6 = sufficient; 10 = excellent).	7.4 (Scaled Question)	1.1	7
The course information as presented in the study guide was clear.	3.0 (Scaled Question)	1.0	3
The Brightspace page of the course contained all	4.6 (Scaled Question)	0.8	7

necessary information.			
The course had a clear and logical structure (i.e. division of topics over the weeks).	4.3 (Scaled Question)	0.8	7
The study load was well divided over the weeks.	4.3 (Scaled Question)	1.1	7
I was well informed about the learning objectives of the course.	4.4 (Scaled Question)	0.8	7
I had the prior knowledge and skills necessary for this course.	4.9 (Scaled Question)	0.4	7
The study materials (i.e. reader, instruction guide, slides, etc.) supported me well in acquiring the required knowledge	4.6 (Scaled Question)	0.5	7
The assignments (e.g. homework, practicals) clearly contributed to my understanding of the course contents.	3.9 (Scaled Question)		7
The assignments (e.g. homework, practicals) had a clear description.	3.6 (Scaled Question)	1.3	7
It was clear to me how the hand-in assignments would be assessed.	3.9 (Scaled Question)	1.1	7
The practical had a clear instruction guide.	4.0 (Scaled Question)	1.0	7
The feedback I got from the teaching assistant(s) at the practical was helpful.	2.8 (Scaled Question)	1.2	6
There were sufficient teaching assistants for this course.	1.4 (1 of n Question)		7
I am aware of the leaming goals of the course.	4.7 (Scaled Question)	0.5	6
The course covered the learning goals.	4.7 (Scaled Question)	0.5	6
The course sharpened my critical thinking and analytical skills.	3.7 (Scaled Question)	0.8	7
The course sharpened my problem solving skills.	3.7 (Scaled Question)	1.1	7
I understand the importance of this course in relation to the entire programme.	3.7 (Scaled Question)	1.4	7
Please grade the course (1 = very poor; 6 = sufficient; 10 = excellent).	6.9 (Scaled Question)	1.5	7
If I were the responsible instructor of this course, I would maintain the following positive aspect(s) of this course:	0.0 (Open Question)	0.0	4
	Regarding the projects: I like that they are big projects, and that they contribute to 50% of the grade. It gives a really nice hands-on experience.		
	The lectures are nice and especially the assignment give a really nice handson experience.		
	The mix of material dealt with in the lectures was very interesting and broadening. The negotiation assignment was fun and informative (apart from GeniusWeb problems).		
	Interesting assignments. Great variety of presenting lecturers, providing different points of view.		

	0.0 (Open Question)	0.0	4
	Please be explicitly clear with requirements that need to be met for each deadline (see assignment 2 phase 1) Don't give recommendations on bad coding practices (code in one file for assignment 2)		
	I really liked the assignments, but the second phase of assignment 2 was mainly aligning protocols with other teams and then fixing a lot of bugs with that communication. I do understand the reasoning		
If I were the responsible instructor of this course, I would work on improving the following aspect(s) of this course: Important: be decent and reasonable in your feedback. Rude or inappropriate feedback will be disregarded.	behind phase 2, as we are creating collaborative agent s. However me and my team would have really liked to spend more time making our own agent better at working together with itself. This would have forced us to think more about the interdependence analysis when there instead of just quite dumb aligning of messages with other teams. I.e. test cases where there is a fully blind agent that is very fast, that could be used as a carrier to get the blocks to the goal quickly. I think this would have encouraged to use what we learned in the course		
	The second assignment was very badly designed. The description of the assignment was very unclear. The assignment didn't contribute to learning the material from the lectures. The framework used also had poor documentation. Trying to make 4 groups of stud ents collaborate is impossible. Every group doesn't want to change their implementation which makes creating an efficient implementation almost impossible. I suggest that this assignment gets overhauled completely and removing the part with groups need to collaborate.		
	The first project was really nice. The first half of the second project was also really nice, but the second part of the second project was just very annoying. I understand that that was likely the point of the project - to show how hard it can be to coor dinate - but still, it was quite a big contrast with the previous two deadlines; since we went from cool -> cool -> extremely annoying. Since 20% of the final grade of project 2 - so that means 5% of my final grade for the course - is the agent playing with others, I really hope for some lenience here, because it is also highly dependent on how other people have done their jobs (programmed their agent well).		
I took the examination of this course:	1.6 (1 of n Question)		64
Prior to the examination it was clear to me how the course would be assessed.	4.0 (Scaled Question)	1.0	23
The main topics of the course were addressed in a well-balanced way in the examination.	4.2 (Scaled Question)	0.9	23
The selected examination method was appropriate for this course. (f.e. written/computer/midterm/oral exam; lab assignments)	4.0 (Scaled Question)	0.9	22
The questions in the final exam were clearly formulated.	4.0 (Scaled Question)	1.0	23
The final examination covered the learning goals of the course.	4.4 (Scaled Question)	0.8	22
The teacher made use of the following online tool during the examination:	4.0 (1 of n Question)		23
I experienced the following aspects of using this online tool during the examination as positive:	0.0 (Open Question)	0.0	12
	The timer on the bottom of the screen.		
	I found the use of weblab to be appropriate for the type of examination. The questions all needed text answers and weblab was great for this.		

	There was an possibility to conveniently ask questions during the exam by using the discussions provided by weblab.		
	The maximum timers were great! we had 25 minutes per block, that system worked great!		
	Nice solution with blocks of exercises		
	Clear / easy to use. Clear timer on each question		
	no particular feedback.		
	The endterm was really well thought-out and covered all the topics in a challenging but fair way.		
	Being able to go back-and-forth between the questions was really helpful. Having both multiple choice and open question was also a positive aspect, together with grouping questions according to topics.		
	The use of question blocks instead of timing individual questions.		
	Familiar, we use this software all the time so it was intuitive to use		
	I liked the balance between open and MC questions		
I experienced the following aspects of using this online tool during the examination as negative:	0.0 (Open Question)	0.0	13
	We sometimes got announcement for questions we could not go back to. This was because you could only answer 2/3 question at a time in a specific timespan. When having an exam on paper this will not be an issue so for next year this problem is hopefully so Ived.		
	The questions were posed in blocks corresponding to 1 subject and there was a time limit per block. The blocks were given to students in a random order as an anti-fraud measure (which is understandable), but that meant that if someone asked about a questi on that was unclear, the announcement clarifying that question came too late for a lot of students. Halfway through the 3 hour exam a question was clarified, but I had gotten that block first and could therefore not access it anymore. This is really unpra ctical.		
	Due to the limited time per question a question I asked through the weblab discussion was not answered on time.		
	The use of time limits was a bit hard, since some parts were a lot harder to finish in time than others. This could be balanced better. I also thought the use of announcements in weblab was a bit odd, since you werent allowed to go back to other questions , so some announcements came too late to be helpful. So either allow us to go back or dont give announcements at all, since it can give an unfair advantage to some.		
	I didn't like not being able to go back to previous questions but I understand why it had to be done like that.		
	The questions in timed blocks is for sure much better than individually timed questions. However still for some blocks I had 10 minutes left, and for some blocks I could not finish it, because I found the questions difficult, or because I made a mistake early on that I only noticed later on so I basically had to restart. I would have really liked to use my spare time on those questions I found hard, but instead I just had a lot of spare time with which I could do nothing.		
	How we should upload the projects could have been more clear.		
	The answers were not always formulated clearly, as a result there came a lot announcements that specified those not clearly formulated questions. However, you could not go back to previous questions if you completed them. Therefore I couldn't change my an swers to the specifications of the announcements and that is costing me points.		
	Announcements were late and hard to notice. Not possible to go back to the question to fix the mistakes mentioned in the announcement.		
	The labs were a bit chaotic due to lack of explanation.		
	The time for the questions was not equally distributed.		

	With the 25 minutes system, maybe update it that it saves everything after 25 mins. There was 1 block where my time was up, I chose to not finalize a question because I could go over time resulting in non saved answers -> O points, but I might have been a ble to finish the question if it simply saved everything right at the 25 mins.		
If I were the course coordinator, I would work on the following things to improve the examination of this course. Important: be descent and reasonable in your feedback. Rude or inappropriate feedback will be disregarded.	0.0 (Open Question)	0.0	10
	The level of the exam does not reflect what should be the level of a CSE exam in the 3d year, I felt it was too easy (especially considering we were even asked definition question and it was an open book exam). I feel like we only went through the topics pretty superficially and I don't feel like I gain a lot of knowledge over this course. (The content was pretty interesting, and the lectures well organized, I would just have hoped that we would go way deeper into the topics)		
	Like i mentioned, take a look at the announcements and the time limits during the exam.		
	Read the negative experience. Make sure your questions cannot be misinterpreted (have it proof read by multiple people) and if a question turns out during the exam to be indeed unclear, be lenient in grading it or disregard it completely		
	More fair time assesment/no blocks of time. The graded assignments were badly planned. deadlines in holydays, two weeks for entire projects it was really subpar organization.		
	Formulate the questions clearly. Organise questions blocks such that each block takes a similar amount of time (not the case in our exam).		
	A different way to communicate to the students. (being in a zoom call, use of mattermost, etc)		
	Don't close the questions of the exam once a student finishes it. Or at least make the questions CLEAR so we don't have to deal with announcements that I can't use since the question is already closed for me.		
	I would work on making the labs a bit more elaborate and offering more help to students.		
	I don't have much to say about the exam itself. It was well done except for the timed question blocks but I understand why it needed to be like that. Regarding the lab, I would suggest overhauling the second assignment as it is unrealistic for 3-4 groups of students to collaborate in 2 weeks.		

Student Panel

General Feedback	Mid-quarter Evaluation Date: 04-03-2021 Students:1 Grade: 6.5 End-quarter Evaluation Date: 23-04-2021 Students: 2 Grade: 6.5, 6.5
Positive Aspects	Mid-quarter Evaluation *Very interesting course, Prof. Jonker gives nice lectures. The other lecturer is also nice. End-quarter Evaluation *The assignments were nice and really made you practice with the content.

Areas of Improvement	Mid-quarter Evaluation * Lab organization: a lot of students experience problems with the lab assignments; there are quite some problems/bugs with starting up GeniusWeb: * Wireshark gives problems in network settings * Signing off the lab is also not flawless End-quarter Evaluation * The libraries that were used during assignments were hard to use. The documentation was not always clear so students sometimes had to revert to trial and error. * The second assignment was a collaboration with other groups, and it was a bit chaotic to get this to work. This assignment also felt a bit disconnected from the course, there was no lecture material that was handled in this assignment either. * As everything was in one file for an assignment, it was really hard to keep an overview of your code, especially when you work with multiple people. Students had to revert to peer/live-programming to code properly in this way. * The description of what was expected from a group was not always clear They mentioned it was mandatory to have a 'working agent' while this was not that strictly needed in the end. This caused quite some stress to this group.
New Ideas	Mid-quarter Evaluation * Keep track of FAQs and frequent issues (such as with Wireshark) so these can be incorporated into the course next year. End-quarter Evaluation

Comments & Improvements

	We are happy with the positive response to the course in its first edition. We thank the students for their active participation and encouraging comments.
Instructor response	• One major comment about the course is about the second assignment, especially the second phase of it, where student teams had to collaborate with each other. As some students understood, such a collaboration is necessary in developing real collaborative AI applications and our goal is to introduce students to this way of thinking and working. In any case, we will consider redesigning this phase to make the collaboration as smooth as possible. • Some students mentioned that the end-term exam was easy for a 3rd year exam. The exam being open book may have contributed to this perception. However, considering that the mean grade in the exam is 7.4 (median 7.6), the exam may have not been easy for all students. We will consider this factor in designing the exam in the next edition. • Some students mentioned that the frameworks used in the practical assignments are not well documented. We agree with this. This course covers emerging topics and some frameworks used in the course are under active development. Also, this was our first experience with some of these frameworks. We expect these assignments to be smoother in the next edition since we have better experience with the underlying frameworks now. Students liked the format of our online exam, which included blocks of questions. This way individual questions were not timed but the blocks were.
Agreed improvements/Future plans	Entered by Instructor (Dr. P.K. Murukannaiah): * Redesign the second phase of the second programmina assignment. Specifically, focus on making the collaboration among teams smooth and emphasize that learning to collaborate with heterogeneous teams is an Important aspect of developing collaborative AI applications. * Slightly increase the difficulty of the end-term exam. * Enhance the documentation of the frameworks used in the programming assignments.

Evaluation Remarks

User	M.P.J. van der Maarel
Due to the low response rate, the Evasys survey results will not be published.	

University Teaching Qualification:

UTQ Final Proof of Competence

Feedback Form for Evaluation of Final PoC

Participant:		Date of Interview:	
First Assessor:		Second Assessor:	

EVALUATING TEACHING		✓/X
a. The lecturer can conduct an evaluation and collect information (data) purposefully to improve his teaching.	The proof shows that the purpose of the evaluation or any specific questions are relevant to the teaching situation.	✓/X
	The evaluation approach (methods, sources and items/criteria) and justification for the choices are made within the context. Incorporated are evaluation results from students and from other sources (e.g. assessment results, colleagues).	✓/X
b. The lecturer can analyse evaluation results, draw conclusions and pinpoint areas for improvement.	The proof contains conclusions about the quality of the course's educational design, teaching and assessment.	✓/X
	The proof contains an explanation how previous evaluation results have been used in the (re)design of the course.	✓/X
	The proof contains concrete recommendations and intended actions to improve the course's educational design, teaching and assessment.	✓/X
Assessor feedback:		

PROFESSIONALISATION	✓/X

a. The lecturer can formulate his own vision on education and student learning.	The proof contains a coherent vision on learning and teaching that is supported with references to literature and/or descriptions of experiences that have influenced this vision.	✓/X
	The proof contains examples which illustrate how the lecturer's educational vision is reflected in his/her teaching.	✓/X
b. The lecturer can manage his/her education and can collaborate in a teaching team.	The proof contains examples that show the lecturer's role in teamwork (e.g. role/tasks, constructive contributions to team work, managing student assistants, etc.).	✓/X
	There is a description of how he/she balances different professional roles (e.g. different teaching roles or the roles of teacher and researcher).	✓/X
c. The lecturer can reflect on his/her work as a teacher and on his/her future professional development in teaching.	The proof contains a reflection on personal strengths, weaknesses and development in relation to the UTQ competences.	✓/X
	The proof contains specific plans for further professional development as a teacher.	✓/X
Assessor feedback:		

Other comments/notes/conclusions:

---End of document--

Proof of Competence UTQ DEVELOP

Participant:	Pradeep K. Murukannaiah	Faculty:	EEMCS
Trainer:	Linda Mebus	Course end date:	13 July 2020
Module code:	UTQ Develop 2006	Submission date:	13 July 2020

PART A: COURSE EMBEDMENT

1.1 Alignment with the programme

The *Collaborative Artificial Intelligence* (CSE3210) course is taught in the Bachelor Computer Science and Engineering (B-CSE) program at the faculty of Electrical Engineering, Mathematics, and Computer Science (EEMCS). I (Pradeep Murukannaiah) am the main instructor for the course.

The Collaborative AI course teaches the design and development of decentralized artificial intelligence (AI) systems that involve collaboration among *intelligent agents,* including humans and artificial agents (such as robots). The topics covered in this course include (1) co-active design of decentralized AI systems; (2) negotiation among autonomous agents; and (3) agent communication and interaction protocols. The learning objectives of the course are:

LO1. Compare *centralized* and *collaborative* AI paradigms
LO2. Apply *co-active design* to solve a collaborative AI problem
LO3. Describe the principles of *automated negotiation* for facilitating agent cooperation
LO4. Describe the conceptual underpinnings of agent interaction protocols
LO5. Create an automated negotiating agent in the Genius Web platform

The Collaborative AI course aligns with the following attainment goals of the B-CSE program found in the Teaching and Examination Regulations:

AG1. The graduate has knowledge of the core concepts and basic methods of the field of computer science such as programming, software engineering, logic, fundamental computer science, databases, web technology, computer systems and networks, information systems and artificial intelligence.
- The Collaborative AI course teaches the core concepts and basic methods in the field of *multiagent systems*, an important branch of artificial intelligence. Specifically, learning objectives LO1, LO3, and LO4 contribute to AG1.

AG2. The graduate has a systematic approach in designing software and software systems.
- In the Collaborative AI course, the students learn to design and develop decentralized software systems that facilitate interaction among intelligent agents. Specifically, learning objectives LO2, LO3, LO4, and LO5 contribute to AG2.

AG3. The graduate takes account of the ethical, temporal and social context.
- One of the modules in the Collaborative AI course—Co-Active Design—is specifically about designing collaborative AI systems, considering ethical and societal contexts from the perspectives of diverse stakeholders. Specifically, the learning objective LO2 contributes to AG3.

1.2 Connection to research and profession

Research: Collaborative AI is an important research topic in the domain of Artificial Intelligence. Research articles about collaborative AI feature in major scientific conferences (e.g., AAMAS, AAAI, and IJCAI) and journals (e.g., JAAMAS, AIJ, and JAIR) on AI. The Collaborative AI course, specifically via learning objectives LO1, LO3, and LO4, introduces foundational concepts, from the book Multiagent Systems, Second Edition (Weiss), preparing students to undertake research on collaborative AI systems at MSc and PhD levels.

Profession: Collaborative AI—where humans and machines assist and augment each other—is an emerging topic that has tremendous business opportunities (Daugherty and Wilson). Examples of collaborative AI systems include (1) relief workers and robots working together in a disaster management scenario, (2) human experts and robots working together in a manufacturing plant,

and (3) autonomous cars coordinating with each other to optimize criteria such as travel time, congestion, traffic incidents, and so on. Major AI companies, such as IBM and Microsoft, recognize the importance of collaborative AI. The collaborative AI course is a first step in preparing students for exciting careers in the design and development of collaborative AI systems. Specifically, learning objectives LO2 and LO5 help students in developing programming skills essential for professional careers such as software engineers, application developers, and AI engineers.

2.1 Entry levels

The Collaborative AI course is as an elective in the third year of the B-CSE program at EEMCS.

- Students entering this course are expected to know *Algorithms* and *Programming*. These topics will be listed as "expected prior knowledge" in the Coursebase. The students in the B-CSE program are exposed to these topics via courses such as, Algorithm Design (CSE 2310), Software Engineering Methods (CSE 2115), Object-Oriented Programming (CSE 1100), taught in the first two years of the B-CSE curriculum. Yet, before the first lab session, I will ask the students to complete a short survey on their experience in Algorithms and Programming. If some students do not have sufficient experience on these topics, I will dedicate the first lab session to provide an overview of the necessary programming knowledge. This session will be optional to students already familiar with programming.
- The collaborative AI course is largely self-contained. However, collaborative AI concepts can often be contrasted with traditional AI concepts, which students may or may not be familiar with, depending on their prior AI knowledge. To compensate for this difference in entry levels, for each collaborative AI concept I teach, I will list the relevant traditional AI concepts, and provide students resources (e.g., reading material) to learn these concepts. I will encourage the students to self-learn these concepts, if they are not already familiar with those, as preparation for each session.

2.2 Inclusive education

I will make all reasonable provisions to accommodate students with additional needs given that I am communicated about these needs in advance. For example:

1. I will include transcripts for all videos and alt texts for all graphics used in the course.
2. I will increase the font size in my lecture slides as required.
3. I will adjust the pace of my lectures, as required, to assist sign language translators.
4. I will encourage group discussions in class to encourage students, who are shy to speak up in class, to engage in discussions with their peers first

PART B: CONSTRUCTIVE ALIGNMENT

3.1 Learning objectives

LO1. Compare *centralized* and *collaborative* AI paradigms
LO2. Apply *co-active design* to solve a collaborative AI problem
LO3. Describe the principles of *automated negotiation* for facilitating agent cooperation
LO4. Describe the conceptual underpinnings of agent interaction protocols
LO5. Create an automated negotiating agent in the Genius Web platform

Below, I map the learning objectives to the cognitive levels in the revised Bloom's taxonomy (Krathwohl and Anderson) and discuss the specifics of these LOs.

- LO1 is at the cognitive level of *Analyze* / *Evaluate*. The students will learn the distinguishing aspects as well as strengths and weaknesses of centralized and collaborative AI systems. This LO can be assessed by asking students to give specific examples of centralized and collaborative AI systems, and justify why those systems or centralized or collaborative in a quiz or a written exam.
- LO2 is at the cognitive level of *Apply*. Co-active design is a design methodology well-suited for specifying collaborative AI systems. This LO can be assessed by asking students to apply co-active design to formulate a collaborative AI solution to a sample problem in a practical assignment.
- LO3 and LO4 are at the cognitive level *of Remember* / *Understand*. This LO can be assessed by asking students to explain the conceptual underpinnings behind agent cooperation and interaction techniques in a quiz or a written exam.
- LO5 is at the cognitive level of *Create*. The students will learn to combine the knowledge they gained about collaborative design, agent cooperation, and interaction protocols to create an automated negotiation agent. This LO can be assessed in the practical assignment where students are asked to create a negotiating agent in GeniusWeb, a well-known platform for creating and evaluating negotiating agents.

3.2 Learning activities

Two modes of instruction in this course are lectures and labs.

- Each topic in the course will be discussed in one or more lectures. I (or one of the other instructors) will present core concepts using a slide deck. The students will be asked to engage in peer-discussions on open-ended topics in small groups in most of the lectures. The instructor will ask some of the groups to describe their views on the topic discussed. The learning objectives LO1, LO3, and LO4 are served by these learning activities.
- In the labs, the students will work on practical assignments that require applying the concepts learned in the course on practical problems. For each practical problem, students receive instructions on the expected input and output. I, the other instructors, or the teaching assistants will answer the students' questions. The learning objectives LO2 and LO5 are served by the learning activities in lab sessions.

3.3 Assessment activities

Formative assessment: LO1, LO3, and LO4 are formatively assessed by two quizzes. The quizzes are not graded but assessed by the instructors or the TAs. The instructor will discuss exemplary solutions and common mistakes on the quizzes in class. LO2 and LO5 are formative assessed by providing feedback on students' work in each lab session. The instructor or the TAs will provide feedback on whether a student is receiving expected output from their implementation or not, and if the output is not expected, the potential problems the implementation may have.

Summative assessment: LO1, LO3, and LO4 are summatively assessed in a written exam at the end of the term. The quiz questions are representative of the exam questions. LO2 and LO5 are summatively assessed by grading the practical assignments students submit. The grading criteria is provided to the students beforehand as part of the practical assignment instructions.

4.1 Active learning

This active learning activity helps student learn the *particle swarm optimization* (PSO) (Kennedy and Eberhart), an optimization algorithm inspired by evolutionary computing. In a nutshell, in PSO, each particle in the swarm starts with a random estimate of the solution to an objective function. In each subsequent iteration of the algorithm, each particle updates its estimate based on the particle's individual best solution and the social best solution based on other particles in the swarm.

This active learning activity illustrates the working of the PSO algorithm. The activity instructions are provided in a webpage, which students can follow from a computer or smart phone.

- Students are divided into small groups and each group serve as a particle.
- The instructions include an objective function the students (particles) will optimize. The instructions also include a widget to measure the fitness of an estimate.
- Each student group will guess a solution to the objective function and measure its fitness.
- Each student group will reveal its estimate and fitness to the groups next to it.
- In the following round, each student group will update its estimate based on the best solution it found so far and the best solution other groups found so far.
- The two steps above are repeated five times.
- Each group notes down its estimate and fitness in each round.
- At the end of the activity, the instructor asks how many groups had an increasing trend in the fitness values, and how many groups did not have an increasing trend.
- A majority of the groups are expected to have an increasing trend.
    - If this is the case, the instructor asks some groups to describe why this happens.
    - If this is not the case, the instructor asks students to reflect on what might have gone wrong.

4.2 Student motivation

Below, I describe how I motivate students, relate the activities to the ARCS model (Keller).

- Collaborative AI is largely an emerging field and active research area. In one of the lectures, I will show a recent keynote talk from the premier conference on collaborative AI and discuss the latest discoveries described in the talk in class. This will motivate students to pursue collaborative AI as a research endeavour. This will raise students' *attention* and demonstrate the *relevance* of their learning to advances in a research field.
- I will encourage students to submit the negotiating agent they create in a practical assignment to the Automated Negotiation Agents Competition (ANAC) (Jonker, Aydogan and Baarslag), which is a prestigious international annual competition on negotiation. This will motivate students to create state-of-the-art solutions. This will increase the students' *confidence* as well *satisfaction* that they can apply what they learn in the course to a real-world setting, competing with state-of-the-art solutions from across the world.
- In one of the lectures toward the end of the term, I will ask students to consider a centralized AI solution and discuss alternative, decentralized, solutions to the problem. For example, the students can consider a centralized social networking service (e.g., Facebook), and discuss ways to make the solution decentralized. This discuss will motivate students to understand the practical significance of the collaborative AI techniques. This will help students reflect on the practical *relevance* of their learning and increase students' *confidence* to build real applications in future (e.g., in their theses or in professional career).

PART C: MANAGING EDUCATION

5.1 Conditions for the course

The *Collaborative Artificial Intelligence* (CSE3210) is an elective course for 5 EC taught. Each EC denotes a study load of 28 hours. So, the CSE3210 course amounts to a study load of 140 hours.

The course includes two modes of instruction: lectures and lab session. Each lecture is for two hours and each lab session is for four hours. There are ten lectures and ten lab sessions in the course (see Table 1 for division of lectures and lab sessions per LO).

The course is taught in one quarter over 10 weeks. There is one lab session each week. There is 0, 1, or two lecture per week.

The time and place for each lecture and lab session is announced on https://mytimetable.tudelft.nl/

5.2 Time allocation

- The instructor will create a slide-deck for each lecture, leaving ample time for student activities, and discussions.
- Each student activity will be timed.
- Since there is more than one lab session for each topic, and each lab session is 4 hours, there is ample time to (formatively) assess lab work of each student.
- Since there are only 10 lectures and about 15—20 lecture slots in a quarter, some of these additional slots will be used to conduct and provide formative feedback on quizzes.

The lectures and the lab sessions amount to total of 60 contact hours. In addition, the students are expected to prepare for the lectures (two hours per lecture), quizzes and exams (two hours per lecture), and complete practical assignments (40 hours outside the lab sessions), amounting to the remaining 80 hours of study load. Thus, the students are expected to spend a total of 140 hours, which is appropriate for 5 EC.

Instructors are expected to spend 2—5 hours as preparation for each lecture, depending on their familiarity with the topic of the lecture and an additional 2 hours in the lecture. TAs as expected to spend 5—10 hours prior to the first lab session, familiarizing with the lab activities and the practical assignments, and 4 hours in each lab session. The instructors and TAs, combined, are expected to spend 5 hours assessing each of the three quizzes, 20 hours to grade each of the two programming assignments, and 20 hours to grade the written exam. This time allocation is feasible since the work is spread between instructors and TAs and spread across ten weeks. The instructors and TAs are expected to start preparing at least one week prior to the first lecture or lab session, and work for at least one week after the final exam.

5.3 Constructive alignment table

Learning Objectives	Bloom Level	Teaching/ Learning activities	Formative Assessment	Summative Assessment	Allotted time	Alignment justification
LO1: Compare centralized and collaborative AI paradigm	Evaluate	Lecture, peer-discussions on strengths on weaknesses of collaborative AI	Ungraded quiz: A combination of multiple choice and short answer questions. Feedback to the class on correct answers and common mistakes	Written exam: A combination of multiple choice and short answer questions.	Two lectures: 2 contact hours for each lecture, 2 hours preparing for each lecture, 2 hours self-study after each lecture.	
LO2: Apply co-active design to solve a collaborative AI problem	Apply	Lecture, lab sessions	Feedback on lab work about expected input/output and potential problems.	Practicum: Programming assignments, with grading rubrics provided beforehand	One lecture: 2 contact hours for each lecture, 2 hours preparing for each lecture, 2 hours self-study after each lecture. Three lab sessions: 4 contact hours for each lab session, 10 hours practice the outside the lab sessions.	
LO3: Describe the principles of automated negotiation	Understand	Lecture, group activity on job negotiation using the Pocket Negotiator tool	Ungraded quiz: A combination of multiple choice and short answer questions.	Written exam: A combination of multiple choice and short answer questions.	Three lectures: 2 contact hours for each lecture, 2 hours preparing for each lecture, 2 hours self-study after each lecture.	

for facilitating agent cooperation			Feedback to the class on correct answers and common mistakes		Two lab sessions: 4 contact hours for each lab session, 10 hours practice the outside the lab sessions.	
LO4: Describe the conceptual underpinnings of agent interaction protocols	Understand	Lecture, group activity on designing an interaction protocol for an ecommerce website	Ungraded quiz: A combination of multiple choice and short answer questions. Feedback to the class on correct answers and common mistakes	Written exam: A combination of multiple choice and short answer questions.	Three lectures: 2 contact hours for each lecture, 2 hours preparing for each lecture, 2 hours self-study after each lecture. Two lab sessions: 4 contact hours for each lab session, 10 hours practice the outside the lab sessions.	
LO5: Create an automated negotiating agent in the Genius Web platform	Create	Lecture, lab sessions	Feedback on lab work about expected input/output and potential problems.	Practicum: Programming assignments, with grading rubrics provided beforehand	One lecture: 2 contact hours for each lecture, 2 hours preparing for each lecture, 2 hours self-study after each lecture. Three lab sessions: 4 contact hours for each lab session, 10 hours practice the outside the lab sessions.	

Table 1: Constructive alignment table

6.1 Professional roles

The *collaborative artificial intelligence* (CSE3210) is a new course.

- I am developing this course in collaboration with two other instructors.
- I am leading the design of the learning objectives, learning activities, and assessments, with inputs from the other two instructors.
- I will be the main instructor for the course, covering the majority of the lectures.
- Upon completion of UTQ, I intend to be the course coordinator for the course.

I will organize a kick-off meeting for the course, at least a week before the beginning of the course, to finalize the roles and responsibilities of each instructor and TA. I will set up a meeting before and after each quiz, practical assignment, and written exam for planning logistics and assessment. A course email will be set up for students to communicate with the teaching team. One TA will be responsible for monitoring and routing each student email to the appropriate instructor or TA.

6.2 Rules and regulations

The Collaborative AI course is developed in accordance with the Teaching and Examination Regulations of the EEMCS's BSc-CSE program.

- The course is for 5 EC as indicated in Article 4 – Composition for programme 2018 (Note: Collaborative AI is not listed in this table since it is introduced in 2020; however, it is a 3rd year elective similar to other courses (e.g., Human Computer Interaction) listed in the table.
- According to Article 2 – Definitions of terms used, a credit is awarded in line with the European Credit Transfer System (ECTS); one credit denotes a study load of 28 hours. Accordingly, Collaborative AI (5 EC) has a study load of 140 hours.
- The feedback and grading will be done in accordance with Article 19 – Determining and announcing the results (Art. 7.13 Section 2, Subsection o WHW). Specifically:
    - Feedback on a quiz will be given as soon as possible but within 15 working days at most as BSc-CSE TER
    - The practical exercises will be graded as soon as possible after the last due date on which (the last part of) the practical exercise was to be handed in, but within 15 working days at most as per the BSc-CSE TER.
    - The written exam will be graded as soon as possible but no later than 15 working days after the examination as per the BSc-CSE TER.
- Participation in the practicum will be mandatory as per Article 11 – (Compulsory) participation in the programme (Art. 7.13 Section 2, Subsection t WHW).
- Reasonable accommodations will be done for students with disabilities in accordance with Article 25 – Adjustments to the benefit of students with disabilities or chronic illnesses (Art. 7.13 Section 2, Subsection m WHW).

6.3 Vision on Education

The Collaborative AI course aligns with the TU Delft's Vision on Education as follows.

- The Collaborative AI course upholds TU Delft's goal of creating engineers that standout because of their mastery of the scientific foundations of engineering. Specifically, Collaborative AI course will help students master the foundations of decentralized AI systems.
- The Collaborative AI course upholds TU Delft's goal of creating engineers that standout because of their ability to reflect on the impact of technological solutions in their socioeconomic context, including ethical dilemmas. This is particularly relevant in the context of the Collaborative AI course, which will emphasize the ethics of AI in multiple lectures and practical assignments.

- The Collaborative AI course will facilitate students in developing and ability to communication and collaboration in interdisciplinary and intercultural teams, a core competence for engineers. The group discussions in class and the group work on practical assignments help achieve this end.
- The practical assignments in the class will serve TU Delft's goal of translating theory to practical application.

The following is my broader vision on education.

Developing my Vision on Education		
How I believe students learn best	I believe students learn best when they are in the "flow channel," i.e., when they perceive the material they are learning as neither too easy (which leads to boredom) nor too difficult (which leads to anxiety).	
How I can enable students to learn successfully	Qualities that I need as a teacher	Expertise in the field Designs active, effective, and efficient learning methods and learning materials Adapts teaching based on reactions and needs of the students
	Methods that I would like to use in my teaching	Active learning Emphasis on foundational concepts Balancing theory and practice
	The role of my research in teaching	I often teach courses in my research area, which helps me in presenting both foundational as well as state-of-the-art concepts Even when I teach courses outside my research area, my research experience helps inculcate a critical thinking attitude in students
	My short-term and/or long-term plans	Short term: Develop and teach a course in 2020. Complete UTQ modules, understanding different education theories. Long term: Diversify my teaching portfolio—develop/teach more courses and participate in curriculum development for new programs. Articulate a teaching vision based on my own experience.

Table 2: Pradeep Murukannaiah's Vision on Education

REFERENCES

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Kennedy, James and Russell Eberhart. “Particle Swarm Optimization.” *Proceedings of the International Conference on Neural Networks*. IEEE, 1995. 1942--1948.

Keller, John M. *Motivational design for learning and performance: The ARCS model approach*. Springer Science & Business Media, 2009.

Jonker, Catholijn M., et al. “Automated negotiating agents competition (ANAC).” *Thirty-first AAAI Conference on Artificial Intelligence*. 2017.

Certificate

DEVELOP

The lecturers of the course in 'DEVELOP' certify that

Phd P.K. Murukannaiah

has completed the course in 'DEVELOP'.

The workload of the course is 40 hours.

Delft, 27-07-2020

i.o. S.J. Coenen-Meevers Scholte

L.F.M. Mebus

Feedback form UTQ DEVELOP

Participant:	Pradeep Murukannaiah	Course end date:	12 July 2020
Trainer:	Linda Mebus	PoC submission date:	13 July 2020
Course code:	UTQ Develop 2006	PoC completion date:	13 July 2020

NOTES AND COMMENTS BY THE TRAINER

Nice work! It was a pleasure to have you as an active participant in the course and sessions.

INSTRUCTIONS: HOW TO USE THIS DOCUMENT

This document is used by the trainer to give feedback on your PoC. The trainer will use the document to comment on your work, advise on how to improve your course assessment, and indicate if improvements need to be made to your PoC. If you need to make changes/additions, you can add comments in the space provided. If you receive your certificate after the first round of evaluations, the trainer will delete the unused 'Participant comments' column'. The following symbols to indicate whether you have reached the pass-level:

✓ Criterion has been met satisfactorily. No additions are needed.

X Needs adjustments or is missing. Please write all additions in a different colour so that it is easy for the trainer and the final evaluators to find.

PART A: COURSE CONTEXT	/X	TRAINER FEEDBACK
LO1. Explain how the course is embedded in the curriculum or degree programme as a whole	/X	

1.1 Alignment with programme	An explanation of how the learning objectives of the course contribute to the objectives or competences of the degree programme has been provided. Examples are provided and if there is a misalignment, solutions are discussed.	✓	
1.2 Connection to research and profession	An explanation of how education connects to ongoing research, or future field of occupation has been discussed using specific examples.	✓	
LO2. The lecturer can design education with respect to the specific (curricular) characteristics and needs of the students.		/X	
2.1 Entry levels	A substantiated explanation is given on how the entry levels (prior knowledge, earlier educational experiences) of students is addressed. If it is currently not addressed, discuss how it could be done.	✓	
2.2 Inclusive education	Explain what reasonable provisions can be made in your course to accommodate students with additional needs.	✓	Nice!

PART B: CONSTRUCTIVE ALIGNMENT		**/X**	**TRAINER FEEDBACK**
LO3. Design education based on the principles of constructive alignment.		/X	
3.1 Learning objectives	Learning objectives are constructed so that they are specific and measurable; their level is appropriate to the place of the course in the programme. The formulation of the LOs are in line with TU Delft guidelines. Any feedback from the trainer is addressed.	✓	
3.2 Learning activities	Show and discuss how modes of instruction are related to the learning objectives.	✓	Nice active variety
	Demonstrate that the learning objectives are fully covered in a valid and reliable manner.	✓	
3.3 Assessment activities	Show and discuss how formative and summative assessment are related to the learning objective	✓	

	Demonstrate that the learning objectives are fully covered in a valid and reliable manner.	✓	
LO4. The lecturer can design active, effective, and efficient learning methods and learning materials.		/X	
4.1 Active learning	A variation of activating instructional methods and assignments in the course are designed.	✓	
	Discuss how sufficient guidance for students to give direction to their learning activities is provided.	✓	
4.2 Student motivation	An explanation is provided of how students are motivated to learn and develop an interest in the field of study. The explanation is related to the elements in the Self-determination Theory and/or the ARCS model.	✓	

PART C: MANAGING EDUCATION		/X	TRAINER FEEDBACK
LO5. The lecturer can design education in a practically and logistically feasible (doable) way.		/X	
5.1 Conditions for the course	The relevant conditions (e.g. ECTs, budget, roster, hours, place, location, type of meeting) are discussed and evaluated.	✓	
5.2 Time allocation	Argue how both lecturer and student activities (e.g. grading, giving feedback) can be dealt with realistically in the available time.	✓	
5.3 Constructive alignment table	The lecturer can design an overview of a constructively aligned course. All learning objectives are covered on the relevant cognitive levels of Bloom's Taxonomy.	✓	The types of activities and assessment are clear and varied. The descriptions could be more elaborate to see the connection better. You have already described it earlier, but seeing it in 1 overview makes the (mis)alignment more obvious.

LO6. The lecturer can manage education and can collaborate in a teaching team.		/X	
6.1. Professional roles	Examples that show the role of the teacher in teamwork are listed (role/tasks, constructive contributions to team work, influence in course design, management, teaching and assessment, and managing student assistants).	✓	
6.2 Rules and regulations	A brief description is provided that explain which rules and regulations govern the course in terms of course design.	✓	
6.3 Vision on Education	The lecturer's Vision on Education is described, explaining their view on what effective teaching is, how they believe students learn, and how this is done/could be done in the course.	✓	

BASIC CRITERIA FOR COMPLETING THE PoC		**/X**	**TRAINER FEEDBACK**
Identification	Name, date and group on first page	✓	
Referencing	Page numbering, numbered captions for all figures and tables. At least 3 references are included in the document.	✓	
Readability	PoC is understandable for non-experts. The text is well-structured. Irrelevant sections and text, and highlighted instructions and have been removed.	✓	
Use of feedback	All instructions from the template have been removed	✓	
Instructions	All blue instructions have been implemented and deleted from the template.	✓	

Proof of Competence **UTQ SUPERVISE**

Participant:	Pradeep K. Murukannaiah	Faculty:	EEMCS
Trainer:	Danika Marquis	Course end date:	7 July, 2020
Module code:	UTQ Supervise 2006	Submission date:	7 July, 2020

Assignment 1: Reflection on UTQ-SUPERVISE-2006, First Session

In the first session, we learned about organizing and conducting an effective first meeting with a student. As a background, we had discussed the "self-determination theory of motivation in supervision," which identifies three important factors—*autonomy*, *relatedness*, and *competence*—that help a student sustain motivation. **This was crucial information for me because I can now reflect on the extent to which each of my activities as a supervisor meet these basic needs of *autonomous motivation***.

Further, we learned about the triad of *content*, *procedure*, and *relationship* in the context of a meeting between a supervisor and a student. The content is about *what*, e.g., in my field, it is about what research questions, what datasets, what computational tools, and so on. The procedure and relationship are about *how* (formally and informally) we are going answer the content questions. We need to balance these factors in any meeting with a student. However, early on, e.g., in the first meeting, it is important to focus more on relationship and procedure than content. This helps in (1) not overwhelming the student and (2) promoting autonomy by encouraging the students to figure out the content on their own to the possible extent.

Assignment 2: The first meeting with your student

Context: I have met with the student a few times as part of the hiring process. We know each other a little bit. The student has some idea about the project they will work on.

Part 2A: Agenda for the first meeting (30 minutes):

1. Introductions – 2 minutes
2. Brief overview of the research project – 5 minutes
3. Establishing a working relationship – 15 minutes
    a. Student's and supervisor's expectations from the project
    b. Student's learning style and the supervisor's mentoring style
    c. How to address diverging expectations or learning/mentoring styles, if any
4. Graduate school requirements and milestones – 5 minutes
5. Immediate next steps – 3 minutes

Part 2B: Reflection on the agenda for the first meeting

<u>Explain how you pay attention during the meeting to relationship, procedure, and content.</u>

The agenda above includes all three elements—relationship, procedure, and content.

- I will start with introductions and provide a brief overview of the project (content). I will keep this overview short and explicitly mention that we will discuss technical details in later meetings. This overview sets the stage for the following discussion.

- Next, I will get to the main part of this meeting, which is about the relationship. In both of the following steps, I prefer the student to describe their views before me. This way, the student does not simply accept the supervisor's view.
    - **Expectations:** First, I will try to elicit the student's expectations from the project. I will ask questions like why they chose this project, what they want to do after the project, how their prior experience relates to this project, and so on. Then, I will describe my expectations from the project. Specifically, I will describe how this project fits within my broader research agenda, who are the stakeholders involved, what skills are required for the project, which of my other students are working on related projects, and so on.
    - **Learning and mentoring styles:** Next, I will try to elicit the student's learning style. Specifically, I will try to understand to what extent the student needs autonomy, what type and frequency of meetings they prefer, what type of feedback they expect, and so on. Then, I will describe what my typical style of mentoring is with respect to autonomy, meetings, feedback, and so on.
- Based on the discussions above about mutual expectations and learning/mentoring styles, I will try to understand if there are any divergent views and how we can reconcile those views to establish a smooth working relationship.
- Next, I will briefly describe the formal requirements and milestones for the degree the student is pursuing. I will also point appropriate resources, which the student can refer to, for understanding the formal requirements in detail.
- Finally, I will discuss the immediate next steps with the student. First, I will point the student toward resources such as the project proposal, related literature, datasets, computational tools, and so on. Next, I will ask the student to come up with a project plan (with intermediate deadlines) before our next meeting. I will reassure the student that it is OK to come up with a plan that is not perfect and that we will revise the project plan together in the next meeting.

Explain how you create a motivational environment using the Self Determination Theory.

- **Autonomy**: On the one hand, I will emphasize that the student should "own" the project for best outcomes as well as learning experience. On the other hand, I will assure the student that, they are not completely not on their own in the project and I, as their supervisor, will guide them through out the process. Finally, although the student may already know this, I will stress that it is OK to make mistakes, but important to learn from the experience.
- **Relatedness**: (1) I will describe how the student's project fits within and is important to my research agenda, demonstrating that I too have an intrinsic motivation to supervise the project. (2) I will describe the long-term vision for the project so that the student knows how their contribution can make a difference. (3) I will describe the research area(s) in which the student can situate their work so that the students can determine what the state-of-the-art is and how to advance it. (4) I will introduce my other students working on related research topics so as to facilitate peer learning. (5) I will encourage students to present their work in symposia and conferences.
- **Competence**: Before committing to supervise a student on a project, I will discuss with the student what I think are the prerequisite skills and to what extent the student already has these skills. I will revisit these in our early meetings. Together with the student, we will determine what skills the student already has and what skills they need to acquire as part of the learning process. I will work with the student (but ask the student to lead) to structure the project, breaking it into subtasks, dependencies between subtasks, prerequisites for the subtasks, and a deadline for completing each subtask. I will also tell the student upfront that research projects do not always work as we expect but that is OK—we will revisit and adapt the plan continually.

What is your goal for the first meeting? What should be the take-home message(s) for your student?

- **Goals**: (1) The student and I are aligned on our learning and mentioning styles. In case we have disparate styles, we don't need to change each other's opinions completely, but reach a consensus on how we will keep a smooth working relationship. (2) The student has a high-level understanding of

the project they are undertaking. (3) The student knows immediate tasks to complete for the next meeting.
- **Take-home message:** The student must own (i.e., be intrinsically motivated about) the project for best learning experience as well as project outcomes.

What information do you want to get out of this meeting and how will you get this information? What do you need to know about your student (and vice versa) to be able to supervise him/her in the best possible way? (e.g. skills, motivation, entry level, interests, pitfalls). What questions do you plan to ask? Give concrete examples.

- I want to gauge the student's **intrinsic motivation**. To do so, I will ask why the student wants to pursue this project, and what they want to do after the project.
- I want to understand the student's **learning style**. Specifically, I will ask (1) how (e.g., online or face-to-face) and how often they want to meet, (2) what type of feedback (e.g., oral vs. written) works best for them, (3) how do they keep track of their progress, (4) how do they maintain the artefacts they create, and so on.
- I want to understand the student's **strengths** and where they **need support** with respect to different research activities. To elicit this, first, I will (generically) breakdown a research task, e.g., as problem formulation, gap identification, method development, experiment setup, and discussion of results. Then, I will ask the student about their experience in each of these phases, and which parts they find challenging.

What do you expect from your students during the project/course, and what may students expect from you? How do you make this explicit? Give concrete examples

- **Transparency**: I expect the student to be transparent about their motivations, requirements, and progress. They can expect me to be transparent about my constraints, the type of support I can provide, and how I will assess them.
- **Perseverance**: The student can (and very likely, will) hit bottlenecks in a research project. I expect the student to know this and be prepared to face it. The student can expect that we will work together to get through the hurdles, e.g., I will meet with the student more often than usual to understand the root causes of a bottleneck.

How do you work with the learning objectives of the course this student is taking (e.g. Master Thesis project learning objectives)? (Please include the learning objectives in the assignment)

- Formulate the problem to be solved.
- Describe closely related research works in the problem domain.
- Identify relevant gaps in the problem domain.
- Propose a solution to the problem under study.
- Describe competing, state-of-the-art, solutions.
- Set up an experiment to evaluate the proposed solution.
- Write a scientific report on the research conducted.
- Present the research conducted to an audience including experts and nonexperts.

How would you use the content of this agenda in the meeting, would you use it as a regular agenda, share it with your student or in a different way.

For the first meeting, I will share this agenda with the student before the meeting. For the subsequent meetings, I will create and share an agenda template with the student. The student and I can both add, update, and prioritize items on the agenda before the meeting.

What do you do/say to give your student a sense of autonomy, competence and relatedness? Give concrete examples

(Answered in my response to the second question from the top)

How is this set up different from your current practice?

This set up is similar to my current practice. One aspect that is slightly different is about the relationship. I strive to understand/convey mutual expectations, often informally, throughout the project. Based on my reflections, I would be more explicit (formally and informally) about the expectations, especially early in the project. Also, in the earlier meeting with a student, I would use more procedure and relationship aspects than the topic aspect.

Assignment 3: Reflection on UTQ-SUPERVISE-2006, 2nd Session

Four key concepts we learned in the second session are: (1) the roles of a supervisor (e.g., teacher, expert, manager, and colleague); (2) the situational leadership model, which prescribes supervising styles (*directive* and *supportive*) based a student's *commitment* and *competence*; (3) important steps in giving feedback; and (4) McClelland's iceberg model, which relates a student's motivations to visible (e.g., knowledge and skills) and invisible (e.g., values, personality, and motives) traits.

The iceberg model made specific impact on me because it relates to how I encourage students in choosing right projects. I work on a variety of research project that differ in, e.g., intellectual difficulty, academic significance, industrial applications, and potential for societal impact. Suggesting an appropriate project for a student depends on understanding not only the knowledge and skills of the student but also their hidden values and motives, e.g., the student's preference for an academic/industry career, the extent to which the student wants to be intellectually challenged, how the student sees the broader impact of their work, and so on. I spend significant time in guiding the student to choose the right project, which yields best outcomes for both the supervisor and the student.

Assignment 4: Giving Effective Feedback

Part 4A: Self-Assessment Tool for Giving Feedback:

Context: The following is a self-assessment of my (Pradeep Murukannaiah's) meeting with Michiel van der Meer, a PhD student, during the third week. I am Michiel's daily supervisor.

Self assessment feedback Version August 2018

Fill in the instrument for a supervision session. Mark the descriptions which are appropriate for your situation. This will give insight into the levels and feedback questions you use in this specific educational setting. In the bottom row you can describe specific words or behavior that you used during the teaching activity.

	SELF		**TASK**		**PROCESS**		**SELF REGULATION**	
	directed at the student himself; it rarely contains relevant task-information is and therefore hardly effective. Teacher praises without specifying the behavior the praise is about.		feedback about how well the task is being accomplished or performed, feedback on content of assignments, i.e. right/wrong calculations, right/wrong understanding of definitions.		feedback specific to the processes underlying the tasks, providing deeper understanding. Teacher provides feedback on thinking activities (how to apply, how to analyse).		feedback to the way students monitor, direct and regulate actions towards the learning objective. It involves interplay between commitment, confidence an control to achieve the learning outcomes. The teacher provides feedback on how the student manages himself to find the right answers, how many help he needs in this process and how he can do this indepently next time.	
Where am I going?	**X**	I give encouragement	**X**	I discuss the learning outcomes with the student	**X**	I discuss the learning outcomes with the student		I discuss the learning outcomes with the student
			X	I discuss the criteria with the student	**X**	I discuss strategies students used or can use to perform a given task	**X**	I ask the student how he is going to achieve the learning outcomes
							X	I ask the student what he needs to achieve the learning outcomes
examples	*(1) You are highly motivated, and that is very important for a PhD student.*		*(1) The goal of your PhD project is to create a deliberation platform. (2) You will develop AI techniques for analyzing perspectives of people in an online deliberation.*		*(1) By the end of your PhD, you will have research expertize in Natural Language Processing. (2) You should formulate a research question, first. (3) Identify the competing approaches to serve as baselines in your experiment.*		*(1) As part of your PhD it is important to publish papers on Natural Language Processing. What conferences and journals in this area do you target? (2) How can I help you in this process? Which aspect of research, e.g., problem formulation, method development, evaluation deisgn, etc., do you find most challenging?*	

How am I doing?	**X**	I give affirmation		I distinguish correct from incorrect answers		I give information about students' strategies for error detection	**X**	I give information related to a task or performance that leads to greater skills in self- evaluation
		I praise	**X**	I ask questions end give statements		I help students learning from errors		I give information that promotes confidence to engage in more challenging tasks or to advance a deeper understanding of the task
	X	I give information about the self as a person	**X**	I give information about errors, depth, quality of work, need for information, neatness and structure	**X**	I give information in relation to the procedure, method or process used to accomplish a task or create a product		I give information about the way the student monitors, directs and regulates actions to accomplish the learning outcomes
			X	I give feedback on the content, structure or other criteria related to the task accomplishment	**X**	I ask open questions to help the student find out where in the process he is	**X**	I stimulate the student to ask questions
					X	I give information about the approach of the task		
					X	I give information about possible alternative strategies		
examples	*(1) This project matches your background very well. It is a great choice. I am confident you will do well.*		(1) Decidem and Deliberatorium are two popular deliberation platform. (2) What is your opinion on the deliberation map structure of the Deliberatorium? Specifically, how well does it scale? (3) In the summary you wrote, the research question is not explicit. (4) In the related works, you		(1) There are three parts to your project--- perspective mining, opinion mining, and implication mining. (2) What do you think can be the topic of your first research paper? I suggest you to choose something that is low hanging		(1) Use the monthly progress monitor tool to keep track of the progress. Let us discuss it in each of our monthly meeting. (2) You should critically question each assumption in a paper. Often relaxing these assumption are the improvements we can bring to an approach.	

			should clearly describe the gaps.		as well as exciting to you. (3) Do you need to acquire any background knowledge before starting this paper? (4) We should compare our approach with MOODs.			
What to do next?				I help building more knowledge, I reteach if necessary		I cue the learner to different strategies and errors	**X**	I help students dealing with feedback and translating it into new/better ways for self- regulation
			X	I help acquiring more or different information	**X**	I ask open questions to help the student find out what the next step is		
				I help for searching ways/ next steps to accomplish the task				
			X	I give directions to obtain more information about various sources				
examples			(1) Read Klien et al.'s seminal paper on Deliberatorium. (2) Take a course on sequential models for Natural Language Processing. Coursera has a good course on this topic.		(1) Can you find a survey article describing the state-of-the-art on perspective mining?		(1) It does not help to complain about reviewers. We should find ways to better describe parts of the paper the reviewers did not understand.	

Part 4B: Reflection on the Feedback Given:

1. What was the goal of the teaching activity?

- Provide a high-level description of the student's PhD project (content)
- Describe the stakeholders of the project (procedure)
- Describe the key milestones of the PhD project (procedure)
- Evaluate the extent to which the supervisor's and the student's goals align (relationship)

- Evaluate the extent to which the supervisor's mentoring style and the student's learning style align (relationship)

2. Did you address all the feedback questions (where am I going, how am I doing, where to next)? Which of these questions did you not answer? Looking back, which moments could you have used to answer those questions?

In this meeting, my feedback was mainly about "where am I going" and "where to next". Since this was one of the initial meetings I had with the student, there was not too much of "how am I doing." I gave feedback on how the student was doing in during the first three weeks but that could have been better. Looking back, I should have asked the student to provide me a summary of what the student had done during the first three weeks, e.g., the papers he read, initial ideas he had for the first paper, and so on, before the meeting. I could have then provided concrete feedback about this summary.

3. What levels of feedback (task, process, self-regulation, self) did you use the most? Why did you use this level the most? Please explain.

My feedback was largely on process and self-regulation levels. I did this deliberately to focus more on procedure and relationship, and less on content in the first meeting. However, I started the meeting at the task level to set the stage. Since I did not know the student sufficiently well, I did not provide self-directed feedback.

4. Looking back, given the educational situation, was your feedback what the student needed at that moment for his/her learning process? Please explain why (not).

I believe the feedback/feed-forward on process and self-regulation was indeed very valuable at this stage in the student's learning process. The student appreciated this feedback but also expressed a need to learn more about the task. Looking back, since the student already knew the high-level task, I should have dedicated at least a part of the meeting to explore the task at a deeper, technical, level.

5. Based on your previous answers, what could you do next time in a similar situation?

- Which feedback level(s) would you give more attention to?

I will give more attention to the task level feedback.

- Which feedback question(s) of Hattie & Timperly would you give more attention to?

I will give more attention to "how am I doing" questions at the task level, specifically about (1) distinguishing correct from incorrect answers, and (2) giving information about errors, depth, quality of work, need for information, neatness and structure.

6. Looking back, to what extent did you:

- Make the student at ease

The student was relaxed in the meeting. Indeed, he led the discussion for the most part.

- Explain your observations and check if the student recognized this
- Explain the effect and check if the student recognized this
- Connect "behavior" and effect

    - **Behavior**: I shared the meeting agenda with the student ahead of time. **Effect**: The student was prepared for the meeting. **Notice**: I think the student noticed this since he was prepared for the

meeting. **Connection:** Setting the goals of a meeting ahead of time helps participants in preparing for the meeting.

- **Behavior**: I put the student in lead early in the meeting. For example, I asked the student to identify and describe the stakeholders' roles based on his understanding, first, and then, I filled in the missing details. I used this for most agenda items. **Effect**: The student was engaged and did most of the talking in the meeting. **Notice**: The student may have not noticed my behavior to put the student in lead during the meeting. However, looking back, the student would have noticed that he was in the lead. **Connection**: Putting the student in the lead increases engagement.

- **Behavior**: I did not convey my preferences as firm rules. For example, I said that I prefer to use LaTeX for writing papers but understand that some people don't like it because of the clumsy markup. Then, I asked the student what his preference is. **Effect**: Knowing that my preferences are not firm, the student is more likely to reveal his/her true preferences in this setting. **Notice**: I think the student noticed my behavior since he did convey some preferences which were not the same as mine. **Connection**: Conveying to the student that I respect their preferences helps them in revealing their true preferences, which is important for sustaining collaboration.

7. Was your feedback balanced? (right amount and ratio between positive feedback and feedback for improvement)

At this stage, the amount of feedback for improvement I gave was sufficient. However, I would give more feedback on the students work in the first couple of weeks. To structure this process, I will ask the student to prepare of summary before the meeting, which I will reflect on before the meeting and discuss during the meeting.

8. How did the student react to your feedback? And, if possible to answer: what did he/she do with your feedback?

The student was generally happy with the feedback. He asked questions when the feedback was not clear. He took notes on things to do before the next meeting. Also, he provided feedback on the meeting, indicating the type of feedback he finds most useful.

Assignment 5: A Difficult Supervision Situation

A description of the situation

A difficult supervision situation I had was with a student who was not handing in intermediate drafts (written reports) on his research but provided me a paper draft very close to a paper submission deadline. Specifically, in last two such occasions, I received the paper draft only one day before the deadline. I have been reminding the student to share intermediate drafts as soon as they are ready and a full draft several days prior to a deadline.

The problems you encounter and why you experience these as problems (what makes it a problem for you)

This is a difficult situation. Since I have not seen intermediate drafts and received the final draft too close to the deadline, I do not have sufficient time to provide feedback on the paper. Of course, I can ask the student

to not submit the paper because I don't have a chance to review the draft. However, the student may see this (not submitting) as a missed opportunity and be upset about it. In contrast, if we submit a half-baked draft, that can put my reputation in the research community at stake. Finally, an option is for me to work on the draft myself and improve it before submission. However, this is also not desirable. One, it overworks me. Two, the student does not learn to improve the paper based on my feedback.

Potential causes for the problems you encounter

Potential causes for the problems above can be that the student (1) is not documenting the research as and when he is completing the intermediate tasks, (2) is shy to share incomplete drafts, and (3) is not budgeting sufficient time for writing. Further, it is also possible that my expectations (about when to provide drafts) are not clear to the student.

Possible solutions for the problems you encounter

- A possible solution to this problem is to require the student to start an outline of the paper as soon as he/she starts the research and establish a detailed project plan with an intermediate deadline for each section of the paper.
- Further, I would strongly encourage the student to write "something" every week.
- I should also make my expectation clear that I want to receive a full draft of the paper at least a week in prior to the submission deadline to provide detailed feedback and an opportunity for the student to incorporate that feedback to improve the draft. If not, we will consider submitting the draft to a different deadline.
- Finally, in case the student is not confident about writing, I will refer the student to the writing center at TU Delft for assistance.

A reflection on these possible solutions (how do you judge these and why do you expect them to be successful or not).

- I think that encouraging the student to produce a write-up each week makes the writing task manageable to the student. The student can reuse these write-ups in compiling the intermediate drafts.
- Having intermediate deadlines helps the student in planning ahead.
- Being clear that we will only submit a paper if a draft is ready at least a week in advance helps the student in better managing the expectation.
- The writing center can enhance the student's confidence about writing.

Assignment 6: Reflection on UTQ-SUPERVISE-2006, Third Session

In the first part of the session, we learned about *monkey management*, an interesting idea about managing your problems (monkeys). An important strategy I learned about effective monkey management is to not take all monkeys on my back but to make sure that each monkey is on someone's back. This was an important lesson because I tend to take my students' monkeys on my back because I can manage them better. Instead, I should let students manage their monkeys, even if it is suboptimal, but provide feedback on improving.

In the second part, we learned about *inter-vision* or *peer consultation*, an eight step, systematic, procedure through which a case-owner can better understand a problem he/she has and devise solution to the problem based on peers' questions, perspectives, and advice. We applied inter-vision in an activity where the case-owner's problem was that a student wanted to graduate because his scholarship was running out, but he was not ready to graduate. I am now practicing inter-vision in my group by asking each student to describe his/her research problem and other group members to provide feedback on problem formulation as well as possible solution space. The students are finding it fun and valuable.

Assignment 7: Peer Observation

The Meeting Plan

Subject: An introductory meeting on a PhD project on "perspectives in deliberation"

Participants: Pradeep K. Murukannaiah (supervisor) and Michiel van der Meer (student)

Date: 26 June 2020

Meeting Agenda (Duration 20—30 min)

- Introductions and goal description
- Content
  - Brief project description
- Procedure
  - Stakeholders
  - Meeting structure
  - PhD milestones
- Relationship
  - Students' goals for the project
  - Supervisor's goals for the project
  - Learning and mentoring styles
  - Peer support
- Immediate next steps

Peer Observation Preparation: Own Experience

Pick a face-to-face meeting in which you supervise a student (thesis, project, etc.) ans

ask a fellow participant of SUPERVISE to come and observe this meeting.

The meeting was between Pradeep K. Murukannaiah (supervisor) and Michiel van der Meer (student). The meeting observer is Woutijn Baars. Meeting was held online.

The context (course/thesis? etc.) the student meeting is part of

Michiel van der Meer is a PhD student and I (Pradeep K. Murukannaiah) am Michiel's daily supervisor. Michiel started his PhD two weeks ago and is somewhat familiar with his PhD project based on the information we gave during Michiel's interview for the PhD position. Further, we (Michiel, Pradeep, and two other promoters for the PhD project) have had two meeting about the content of the PhD project. This is the first meeting I am having with Michiel focusing on procedural and relationship aspects.

The relevant content

Michiel's PhD project is part of a larger NWO Hybrid Intelligence project. Specifically, Michiel's project is about "mining texts for perspectives in human-machine deliberation." During the PhD project, Michiel is expected to develop Artificial Intelligence (Natural Language Processing, in particular) techniques to find the underlying structures of debates and group deliberations with the idea that we can help participants to a debate / deliberation to understand why others have a different opinion in this debate.

The final learning goals of the assignment (e.g. thesis learning goals; course

goals of the course in which the student executes the assignment). If such final

goals have not been formulated for the context, formulate your own.

(The following is Pradeep's formulation, based on TU Delft's Doctoral Regulations 2018)

By the end of the PhD project, the student will be able to:

- Conduct independent scientific research in the area of Artificial Intelligence (AI). Specifically, the student will learn to:
    - Identity relevant state-of-the-art approaches
    - Identify gaps in state-of-the art approaches
    - Formulate research questions
    - Develop AI techniques for mining deliberation texts
    - Design and conduct experiments to evaluate the techniques developed
- Disseminate research via scientific papers and reports, describing novel approaches, experiments, results, and related works.

- Produce a doctoral dissertation as a contribution to science, ensuring the code of conduct and professional code in the area of science concerned and the university regulations.
- Maintain the customary academic contacts with fellow scientists by presenting research works in, e.g., conferences, workshops, colloquia, and symposiums.

Learning goals for this particular meeting

By the end of this meeting, the student will be able to:

- Provide a high-level description of the "perspectives in deliberation" PhD project (content)
- Identify the stakeholders of the project (procedure)
- Describe the key milestones of the PhD project (procedure)
- Evaluate the extent to which the supervisor's and the student's goals align (relationship)
- Evaluate the extent to which the supervisor's mentoring style and the student's learning style align (relationship)

What is your task and role in this particular meeting?

I will be the daily supervisor of Michiel in this PhD project.

My tasks in this meeting are to:

- Gauge the extent to which Michiel understands his PhD project and answer any questions about the project
- Elicit Michiel's goals and learning style
- Describe my goals and mentoring style
- Discuss if our goals and styles align or not; and, if they don't align how we can accommodate each other to establish a smooth working relationship

What concrete student and supervisor activities you plan to do during this particular meeting?

This is the first meeting focused on procedure and relationship that I had with Michiel. The meeting involved a rather informal discussion between Michiel and me.

How/what did the student prepare for this meeting?

The student was told that the meeting will be focused on procedure and relationship. The student was asked to:

- Reflect on his goals from the PhD project and learning style prior to the meeting.
- Read a few research papers on the topic of AI-supported deliberation to gain a high-level insight on his PhD project.

How did you prepare for the meeting (e.g. did you make an agenda, read students work)?

- I reflected on my own goals from the PhD project and my mentoring style.
- I prepared an agenda for the meeting (in another document).
- I read the student's notes on the papers he had read.

Summary of the Peer Feedback

Name supervisor: Pradeep K. Murukannaiah Name observer: Woutijn Baars	+ 0 - na	**Observations** (*Tip: try to be as concrete as possible, what did the supervisor do or say?*)
Start & setting		
• Are a goal and an agenda set for the meeting? • Does the supervisor check if the mutual expectations for the meeting are aligned. • How is the atmosphere during the meeting? (Relaxed, tensed…)	+ 0 +	Yes, clear agenda; shared with the student. He was asked to reflect on a few topics as preparation for the meeting. Pradeep could have asked if there are specific things the student would have liked to discuss (which were not part of the agenda). Relaxed and casual atmosphere. No apparent feeling of hierarchy. Mutually respectful and professional.
Listening, summarising and asking further questions		
Does the supervisor: • Ask open-ended questions? • Invite personal reactions of the student? • Show interest in what the student is doing? • Make a clear judgement? (not disguised in a closed, suggestive question)	+ + + 0	Open questions were asked, e.g. "what are your goals of the project?" and "who are the stakeholders in your opinion?" Student took the lead in discussing these (autonomy). Pradeep added parts, gave his opinion, and acknowledged where he and the student were on the same page (e.g. roles of stakeholders, goal of the project, publishing strategy). Pradeep genuinely listened well (good body language, no interruptions, patient). Judgements were present, but it was not clear what was often Pradeep's personal preference, versus what is 'common practise' (in PhD supervision). This by itself is not bad, but Pradeep can make things more 'personal' to explicitly express HIS supervising style to the student.
Does the supervisor summarise during the conversation?	0	Partially. Pradeep was assertive in ensuring all the details of behind the agenda items were covered. Perhaps a clear 'agreeing-type' of summary (just 2 sentences) before 'crossing off' the agenda points would have benefited a clear structure. It could have also served as 'concrete outcomes' of the meeting (which the student should have documented…in this case for his PhD agreement).
Does the supervisor give the student time to react?	+	Yes, the student (who really took his time to answer) was able to express his opinions. Pradeep then reacted to the student's viewpoints, meaning he was genuinely interested in aligning their work ethics for a good supervision process.
Feedback & feed forward		

What levels of feedback are used?					Primary process-related (the meeting goal was related to the supervisor/student arrangement and high-level tasks of the PhD project). When they shortly discussed the content and next steps (a bridge to the next meeting), Pradeep gave feed forward suggestions on the process and self-regulation levels.
Task	x				
Process	x				
Self-regulation	x				
Self					
Are positive feedback and feedback for improvement balanced? Does the supervisor check if the student understood the feedback? And if yes, how?					Reasonably balanced. Pradeep acknowledged what he agrees on (e.g. he agreed on the student's strategy to keep open pathways to industry and academia, as well as his view on the publication process). What was perhaps missing was the extra 'check' on points that Pradeep brought up. Occasionally, the student kind of neglected or twisted away from it in the conversation, not knowing whether he agreed/understood. Though, Pradeep gave balanced feedback with room for the student to comment on: "this works typically for me, what is your view?" and "or do you prefer something else?"
Is the student stimulated to define concrete steps based on the feedback?					This applies to some of the feed forward steps. Student was asked to prepare his thoughts on various 'pull projects' and to draft a timeline/plan of initial tasks in his PhD. The feedback in that regard was not too concrete, but this student seemed independent enough and to be o the level that he can perform those tasks.
Does the student or the supervisor decide what these steps are?					Yes. A few steps were agreed upon, and the student confirmed his understanding of those (literally: 'I know what to do this week'). He will look into various ideas for 'pull projects' to get the PhD project going (review article, developing content) and draft a timeline/plan for the first set of tasks of his PhD (which they will discuss next time).
Are these steps affirmed? (e.g. notes, summary)					Not that I was aware off. It may be advantageous for Pradeep to explicitly ask the student to summarize the major points agreed upon in the meeting (and combine that with an agenda for the next meeting, which the student can draft). This ensures the student takes the lead in his own PhD project. The many procedural points discussed in this meeting are useful to include as a one-pager in the PhD agreement that the student is supposed to write.
Which of these roles did the supervisor take? And was it the appropriate role for this situation?					
counselor	x	teacher			Appropriate roles for this introductory meeting, in which Pradeep set a clear tone as being the main supervisor of a 4-year PhD project. He conveyed the message he will be a casual, and knowledgeable (primary) supervisor who is on top of the project.
monitor		guide	x		
friendly colleague	x	manager	x		
expert	x	examiner			

How active was the student during the meeting? Mark on the scale.

1. Who did the talking?

2. Who set the agenda?

3. Who owned the problem?

4. Who decided what the follow up will be?

What were critical moments during the meeting?

This was a meeting that focused almost exclusively on the procedural aspects and supervisor/student relationship. Discussing all stakeholders was critical, because of the many involved (four at least). Getting a clear consensus on the roles and meeting strategy is beneficial for the rest of the project. Pradeep spent a lot of time on this, which is justified.

Another critical moment was the positioning of the student's interest within the larger scope of the project. Pradeep took his time to hear the student out on why he chose this PhD project, where his interests lay, and where he wants to make major contributions. Discussing this along the lines of how much space there is for the student to steer the project towards certain areas of research, and how that aligns with Pradeep's views (e.g. certain constraints of the project's content) would have been good.

What did you learn from this meeting for your own practice?

Pradeep really took the time to talk about milestones and procedural aspects. Although this seemed to be trivial to me at first, it was an eye-opener to see this being discussed clearly at the start of a PhD (although some of it may be a repeat to what the student read, heard before, etc.). It cannot hurt to discuss this explicitly and helps for drafting a PhD agreement. I will certainly attempt this approach myself in 'first meetings' with both MSc and PhD students, in which I used to focus too much on the project's technical content, right from the start.

Pradeep balanced open questions well with suggestions (e.g. "I like to do this and that, some tend to…, does this work for you?). This helped to keep the conversation to-the-point and to come to a quick agreement on the supervision style, with still hearing the student out.

I sincerely appreciate Woutijn's feedback on my supervision meeting. The key feedback I received on improving the supervision meeting includes the following.

- **Suggestion**: I could have explicitly asked if the student had specific things to include in the agenda. **Response**: I agree with the suggestion. Indeed, for the following meetings, I prefer to develop a meeting agenda jointly with the student.

- **Suggestion**: I could have been more assertive about my preferences. **Response**: This is something I do deliberately. Although I have clear preferences, I tend to be not assertive in order to elicit true preferences of the student. Also, I want to convey that my preferences are negotiable for mutual

benefit.

- **Suggestion**: I could have added some "extra check" questions when the student did not directly answer my question. **Response**: Great suggestion and I will work on it.

- **Suggestion**: Ask the student to summarize the major points agreed upon **Response**: Another great suggestion! Indeed, this is what I tried to by asking the student to describe the immediate next steps. Perhaps, I can make it more explicit.

Summary of the Student Feedback

Questionnaire feedback student to supervisor

You can use this questionnaire to ask feedback from your student about your supervision. Please feel free to add questions or to adjust it to your needs.

Intro

With this questionnaire, we would like to ask you for feedback on the performance of your supervisor. He/she will use your feedback to improve in this role. Therefore, we would like to ask you to be honest and specific. This questionnaire consists of several questions in which you are asked you to rate the performance.

Thanks a lot for your valuable feedback!

Start of the project

These questions focus on the start of the project.

To what extent was it clear for you what the (learning)goals of the project are?

0 1 2 3 **4** 5

To what extent was it clear, how you will be assessed and what criteria will be used?

0 1 2 **3** 4 5

To what extent was it clear, how the responsibilities (student and supervisor) are defined for the project?

0 1 2 3 **4** 5

To what extent was it clear, what you could expect from your supervisor and what your supervisor expected from you?

0 1 2 **3** 4 5

Please provide a brief motivation

On a high level, I get what the goals and responsibilities are from a PhD project. It is especially nice to talk about them in a very explicit way, which helps in shaping expectations, but also gives a manageable overview of what can be accomplished in four years. However, all of the questions are 4/5, since I feel like there was a clear distinction between procedure and content. The content is difficult to discuss, because it is very open for the foreseeable future. In this sense, the exact assessment criteria stay somewhat unclear. Furthermore, I would have liked some more pointers on how to communicate with my supervisors about it (e.g. stay on high level, or go in depth about specifics, when to call them in for help). We did talk about this, but for next time we can do this a bit more. While I liked talking about how I would explain my supervisor's role in the project, again I missed the concrete points a bit.

Feedback

These questions are about the feedback you receive from your supervisor.

To what extent was the feedback clear?

0 1 2 3 **4** 5

To what extent was it clear for you at the end of the meeting what are your next steps and how to start with this?

0 1 2 3 4 **5**

To what extent are positive feedback and feedback for improvement balanced?

0 1 2 **3** 4 5

Please provide a brief motivation

I don't really think we talked about feedback a lot, but I answered the questions keeping in mind our discussion in general. I put a 3 for the last question, which I think could also be caused by the fact that we mainly talked about procedural things, where we mostly agreed or had no clashing opinions. However, when we touch on content I really hope we do have those, as I personally think having a bit more of a discussion is interesting. I can use a bit more critical feedback.

Meeting

What did you like about this meeting?

It was a very explicit talk about the way the supervision is set up, and a lot of things I assumed were now mentioned specifically. I think this is great, and paves the way for a fruitful collaboration between us.

What would you have liked to be different in the meeting?

The meeting was setup in a good way. I don't think there are many other things I would have liked to be different, except the points mentioned in the first feedback box.

General questions

What are specific strengths of your supervisor?

Pradeep gave some real nice tips on the way I should approach project management (push/pull analogy) and very much is concerned with managing the pressure. Furthermore, he is motivated to improve himself, also as a supervisor, which I think makes it easy for me to talk to him.

What could your supervisor do to support you even better in your learning process? (e.g. to

Maybe talk some more about your own experiences, or some more about the social dynamics within research groups, which for me is at the moment a bit vague (This is also caused by never meeting people in person due to corona. I don't expect others to perfectly deal with this but it is taking a real toll on judging other people's character),

I sincerely appreciate Michiel's feedback on my supervision meeting. The key feedback I received on improving the supervision meeting includes the following.

- **Suggestion**: The student would have liked some more pointers on how to communicate with his supervisors about it (e.g. stay on high level, or go in depth about specifics, when to call them in for help). We did talk about this, but for next time we can do this a bit more. While I liked talking about how I would explain my supervisor's role in the project, again I missed the concrete points a bit.
- **Suggestion**: The student would have liked me to talk some more about own experiences, or some more about the social dynamics within research groups, which for me is at the moment a bit vague.
- **Response**: Both suggestions above are great. I will be happy to discuss these further in the following meetings. Indeed, I will talk about procedural and relationship aspects whenever there is an opportunity.

Lessons learnt from your colleague and/or inspiration gained from your colleagues' supervision meeting

- I liked how the supervisor put the student in lead and clearly mentioned what the supervisor's role is. I often tell students that I assist them in all stages of their project and strive to do that. I think I need to more realistic about this. For some projects, I should only take the guide/monitor/manager role and be explicit about it.

- I liked the time management in this meeting. I often elicit a lot of reaction from students, which is not bad, but my meetings also tend to run much longer than I plan for. I should plan better. Perhaps, I should have a max time per agenda item.

- I liked how the supervisor set expectations and clearly articulated what is not feasible in the given timeframe. Often, I set high expectations but do not discuss worst case scenario. I should do a critical feasibility analysis with the student.

Assignment 8: Reflect on what you learned in SUPERVISE and what you want to develop further as a supervisor making a personal DAKI

Drop: What should you stop doing?

- Trying to manage students' monkeys (problems) on my back. When a student complains that certain tasks are inconvenient or that he/she is bad at it, I tend take that task for me. I should stop this. If a task is a student's responsibility, the student should complete it. If the task is difficult for the student, I should assist the student but should still keep the student in the lead.

- Working too close to the deadlines. This happens often because a student provides me a draft too late. This situation is stressful to me as well as the student.

Add: What should you start doing?

- Establishing a project plan with intermediate deadlines and deliverables for each research project. I have been doing this informally so far. However, I should make this more formal so that students better understand my expectations.

Keep: What should you continue doing?

- Keeping the student in the lead in my discussions with the student.
- Active listening to clearly understand students' problems.
- Respecting and accommodating students' learning styles and preferences.
- Maintaining a professional yet friendly atmosphere, where students are relaxed and willing to discuss their true preferences and real problems with me.

Improve: What would you like to improve?

- Better time management in my meetings with the students. I often have open-ended discussions with students in my meetings, which are difficult to time. As a result, we won't be able to complete all

items on agenda in a meeting. I should recognize such agenda items ahead of time, and structure the meeting such that important and pressing items are discussed before the open-ended topics.

- Balancing feedback and feed-forward. I often give more input on “where am I going” and “what to do next”, and not as much input on “how am I doing.” This is mainly because I think that students already know how they are doing. However, I realize that this is not necessarily the case. I should give more input on “how am I doing.”

- Setting the right tone in the first meeting. I should include more procedure and relationship aspects than I currently do in my initial meetings with a student.

Certificate

SUPERVISE

The lecturers of the course in 'SUPERVISE' certify that

Phd P.K. Murukannaiah

has completed the course in 'SUPERVISE'.

The workload of the course is 40 hours.

Delft, 27-07-2020

i.o. S.J. Coenen-Meevers Scholte

D.E. Marquis

TU Delft

Feedback form UTQ SUPERVISE

Name candidate: Pradeep Module attended: 2006 Trainer: Danika	Date proof handed in: 4TU_UTQ competences addressed in this proof: 1d, 2a, 2b, 2c, 5a

Feedback overall: Good work overall. I am very happy with this POC, which shows clear reflections and plans for improvement.

The following symbols to indicate whether you have reached the pass-level:

✓ Criterion has been met satisfactorily. No additions are needed.

– Needs adjustments or is missing.

Please write all additions in a different colour so that it is easy for the trainer and the final evaluators to find.

Assignment 1: Reflection on the first course session

- description of one moment from the session that made an impact on you.
- explanation of how you can relate this to your own practice

Feedback: ✓

This is a good summary of the key points from the first session.

Assignment 2: First meeting with your student

Agenda for the first meeting

- content
- procedure
- relationship

Feedback: ✓

Your agenda is clear and concise, but I do worry that it is a lot to cover in just 30 minutes. In particular, giving only 5 minutes to discussing and setting up milestones seems too little. But I see in your explanation that you set it as their first assignment to propose deadlines, etc.

It does make sense to end with the next immediate steps. Good work.

Reflection on the first meeting	
• relationship, procedure and content • motivational environment **Feedback:** Your explanation and reflection are clear and you refer back to the literature. Excellent.	✓
Assignment 3: Reflection on the second course session	
• description of one moment from the session that made an impact on you. • explanation of how you can relate this to your own practice **Feedback:** It is interesting to hear that the iceberg model by McClelland resonated with you.	✓
Assignment 4: Giving feedback	
Self-assessment instrument	
• filled in self-assessment form is added	✓
Reflection on the self-assessment	
1. The goal of the teaching activity	✓
2. <u>What levels</u> of feedback you gave and <u>what questions your feedback answered</u>: (where am I going, how am I going and where to next?) according to the model of Hattie and Timperly and why?	✓
3. Why the feedback was/was not what the student needed at that moment in his/her learning process.	✓
4. Based on your reflection, what you would do next time in a similar situation? • What to give feedback on (e.g. which questions more/less, which levels level(s) more or less attention) • How to give feedback (e.g. creating the right setting, timing, checking understanding	✓
5. Specific examples of the feedback you gave (what did you do/say?)	✓
6. To what extent you explained behaviour and effect and how you connected these	✓
7. Why the feedback was/was not the right amount and balanced	✓
Feedback: a good reflection overall. One difference in your assignment, was your interpretation of the "How well did you connection behaviour to effect" question. Most teachers link this to the previous sub-question, and talk about how they connected the student's behaviour to an effect for the student (e.g. "you by missing the smaller deadlines, you were unable to submit your conference paper on time"). This is helpful when giving feedback to students. However, since you were not giving a lot of	

feedback to the student in this particular session, this would have been hard for you to answer that way. Thus, your current interpretation of considering how your own behaviour has an effect on the student is both interesting and valueable.

Assignment 5: Difficult supervision situation	
• a description of the situation • the problems you encounter and why you experience these as problems • possible solutions for the problems you encounter • a reflection on these possible solutions (how do you judge these and why do you expect them to be successful or not). **Feedback:** A good example with great solutions. I hope they work.	✓

Assignment 6: Reflection on session 3	
• Description of one moment from the session that made an impact on you. • Explanation of how you can relate this to your own practice **Feedback:** It is great to hear that you are using the style of intervision in your own teaching!	✓

Assignment 7: Peer observation	
Meeting plan	
1. Description of the context (course, thesis)	✓
2. Relevant content (e.g. assignment in two sentences)	✓
3. Learning goals of the assignment	✓
4. Your task and role	✓
5. How you and the student prepared for the meeting	✓
Your own experiences during the meeting	
• What went well, did it go as planned, how did you feel, how was the atmosphere?	✓
• Give concrete examples	✓
Feedback from student and peer	
1. A summary of the feedback of your peer	✓
2. A summary of the feedback of your student	✓
3. The filled in feedback form (peer)	✓

4. The filled in feedback form (student)

Feedback: I struggled initially to see the numbers marked by the student in their feedback form because the colour is dark blue, so doesn't contrast with the other options. When you add this POC to the full portfolio, maybe make the students feedback (at least the numbers) red, so that it is clearer. ✓

Lesson learnt/inspiration gained from peer	
• The assignment contains concrete examples	✓

Reflection	
• Overview of strong points and points to improve based on your own observations and the received feedback • Concrete examples of how you want to improve this	✓ ✓

Feedback: Good work. A nice reflection on the feedback.

Assignment 8: DAKI	
• DAKI: overview of what you want to drop, add, keep and improve with regard to your supervising	✓

Feedback: a strong ending, with a clear path. Good luck ahead!

Proof of Competence **UTQ ASSESS**

Participant:	Pradeep K. Murukannaiah	Faculty:	EEMCS
Trainer:	Erna Engelbrecht	Course end date:	02/10/2020
Module code:	UTQ Assess 2010	Submission date:	

PART A: ASSESSMENT PLAN

1. Introduction to the course(s)

Table 3 provides an overview of the Collaborative Artificial Intelligence (CSE3210) course. I am currently developing this course (including learning objectives, learning activities, and assessment tasks) and I will be the Responsible Instructor for the course when it starts in February 2021.

I choose to analyze this course in the Part A of UTQ Assess PoC in order to design this course with constructive alignment (Biggs, 2014) in mind from the beginning.

Overview of the course	
Course code and name	CSE3210: Collaborative Artificial Intelligence
Number of lecturers, TAs, etc., and their roles	**1 Responsible Instructor**: Course design; teaching; assessment (grading and feedback) of quizzes and exams; training and supervising the TAs; main point of contact for the course. **2 Co-Instructors**: Course design; teaching; assessment (grading and feedback) of quizzes and exams. **2 Teaching Assistants** (to be found): Lab supervision; verifying exams, lab instructions, and practicum; assessment (grading and feedback) of practicum; monitoring the course email box and routing the emails to the appropriate course staff.
Number of students	60—80 (expected)
ECTS	5
URL for study guide	https://studiegids.tudelft.nl/a101_displayCourse.do?course_id=56295
Learning objectives (in line with Develop guidelines)	**LO1**: Compare *centralized* and *collaborative* AI paradigms **LO2**: Apply *co-active design* to solve a collaborative AI problem **LO3**: Describe the principles of *automated negotiation* for facilitating agent cooperation **LO4**: Describe the conceptual underpinnings of agent interaction protocols **LO5**: Create an automated negotiating agent in the Genius Web platform
In one sentence, describe what your students will learn by taking your course.	The students taking this course should learn techniques to facilitate interactions among intelligent agents, including humans and AI agents, to realize collaborative AI systems.

The most predominant assessment problem in the course	This is a new course, to be taught for the first time starting in February 2021. I expect grading the open-ended questions to be the most challenging aspect of assessment for this course.

Table 3: Overview of the course

2. Assessment plan for the course

Table 4 shows an overview of the assessment plan for the Collaborative AI (CSE3210) course. There are three online quizzes (Q1, Q2, Q3), three lab reports (L1, L2, and L3), three practical assignments (P1, P2, and P3), and one final exam.

Assessment name/ method	**Question types or deliverables**	**Individual or group (and group size)**	**LOs**	**% of final grade**	**Grading method (rubric/answer models/ …)**	**Grade; points; pass-fail; feedback only; n/a**	**Type of feedback provided**	**Deadline for communicating grade/ feedback**	**Deadline / exam date**	**Grade valid at the end of the course in case of fail?**
Online Quiz Q1, Q2, Q3 Formative	Multiple choice, short answer, and open-ended questions	Individual	LO1 LO3 LO4	0	Answer model	Feedback only	Feedback to the on correct and incorrect answers right after submitting the quiz	Week 2 (Q1) Week 5 (Q2) Week 7 (Q3)	Week 2 (Q1) Week 5 (Q2) Week 7 (Q3)	NA
Lab report L1, L2, L3 Formative	Summary (max 1 page) of the lab activity	Group (3—4)	LO2 LO5	0	Answer model (expected input and output)	Feedback only	A discussion in the lab on activity and common mistakes students made	Week 3 (L1) Week 6 (L2) Week 7 (L3)	Week 3 (L1) Week 6 (L2) Week 7 (L3)	NA
Practical P1, P2, P3 Summative	Report + Code	Group (3—4)	LO2 LO5	15% 15% 20%	Grading rubric	Grade and feedback	Points, with justifications, for each components of the submission	Week 6 (P1) Week 9 (P2) Week 11 (P3)	Week 4 (P1) Week 7 (P2) Week 9 (P3)	Only in the same academic year

Final exam Summative	Multiple choice, short answer, and open-ended questions	Individual	LO1 LO2 LO3 LO4 LO5	50%	Answer model, grading guide	Grade and feedback	A discussion in class on the model answers and common mistakes to the exam questions.	Week 13	Week 12	No

Table 4: Assessment plan

3. Description of the assessment plan

To pass the course, a student must get a grade of (1) >= 5.0 in practical assignments, (2) >= 5.0 in the final exam, and (3) >= 5.8 combined (average of the practical assignments, and the final exam). The passing requirements for the individual grades are lower than the combined grade so that students can compensate for one in the other, but the students must get a minimum in each.

The final exam and the practical assignments are both intermediate results and will not count separately for the next academic year. Only the final grade will remain.

The written exam has one resit in the same academic year. The practical does not have a resit. The practical does not have a resit because it requires group work.

4. Critical reflection on constructive alignment: suggestions for improvement

4.1 Assessing all the learning objectives using relevant assessment methods

The LOs for the Collaborative AI course were revised with feedback from UTQ DEVELOP module.

- All LOs are being tested, formatively as well as summatively.
- LO1 is at the Bloom (Krathwohl & Anderson, 2009) *evaluate* and it is assed via open-ended questions, e.g., to list the tradeoffs between a centralized vs. a collaborative design of an AI system.
- LO3 and LO4 are at the Bloom level *understand*, and they are assessed via a combination of multiple choice, short-answer, and open-ended questions.
- LO2 is at the Bloom level *apply* and it is assessed via practical assignments where students are asked to apply the methods they learned to sample problems.
- LO5 is at the Bloom level *create* and it is assessed via a practical assignment where student create a negotiating agent on a state-of-the-art research platform.

4.2 Balancing formative and summative assessments

- The formative assessment tasks mirror the summative assessment tasks.
- For LO1, LO3, and LO4, the online quizzes (formative) include questions representative of the questions in the final exam (summative). The students receive feedback in the form of correct or model answers right after submitting the quiz.
- For LO2 and LO5, the students work in lab sessions on the practical assignments. The students write lab reports (formative) describing the activities they are performing and the problems they encounter. The TAs will compile a list of common problems and best practices and make it available to the students. Students can incorporate the best practices in the final versions of the practical assignments (report and code) they submit for grading.
- There is at least one-week (often longer) period between the formative feedback and the corresponding summative assessment deliverable deadline.
- The feedback to the final exam (summative) will be a discussion (after the exam) of model answers and common mistakes to the questions in the exam.

5. Assessment regulations and guidelines

Two sections from the relevant regulation documents.

- From the Rules & Regulations of the Board of Examiners EEMCS:
  - Article 14A Taking written and oral examinations
- From Teaching and Examinations Regulations EEMCS (Bachelor CSE):
  - Article 21 – Discussing the examination results (Art. 7.13 Section 2, Subsection q WHW)

Compliance with Assessment Regulations.

Collaborative AI course complies with the assessment regulations mentioned in Article 17 of the Rules & Regulations of the Board of Examiners EEMCS. In particular:

- The weights of the components are communicated to the students before the course begins in a transparent manner.
- The students are required to get at least a 5.0 in all required components and at least 5.8 combined (average of all required components) grade to pass the course.

The final exam and the practicals are conducted following the guidelines in Articles 14A, 14B, 15, and 16 in the Rules & Regulations of the Board of Examiners EEMCS.

PART B: TEST RESULT ANALYSIS

Table 5 shows an overview of the Computational Intelligence (CI) course I analyze in Part B of this PoC. I choose a different course in Part B because the course I analyze in Part A is a new course and it does not have any assessment data yet.

Overview of the course	
Course code & name	CSE2530: Computational Intelligence
Person(s) teaching the course	**1 Responsible Instructor**: Course design; teaching; assessment (grading and feedback) of quizzes and exams; training and supervising the TAs; main point of contact for the course. **2 Co-Instructors**: Course design; teaching; assessment (grading and feedback) of quizzes and exams. **5 Teaching Assistants**: Lab supervision; verifying exams, lab instructions, and practicum; assessment (grading and feedback) of practicum; monitoring the course email box and routing the emails to the appropriate course staff.
Number of students	About 200
ECTS	5
Study guide URL	https://studiegids.tudelft.nl/a101_displayCourse.do?course_id=55127
Learning objectives	**LO1**: Position computational intelligence (CI) as a field in AI **LO2**: Apply the most appropriate CI technique for a given problem **LO3**: Explain the concepts of problem space, fitness, candidate sampling **LO4**: Apply *reinforcement learning* techniques to given problems **LO5**: Apply appropriate *neural networks* to given problems **LO6**: Apply *evolutionary techniques* (GAs, ESs, & GP) to given problems **LO7**: Apply appropriate *swarm-based techniques* to given problems
How the course fits into the programme	Computational Intelligence (CI) is a 2nd year course in the Bachelor Computer Science and Engineering (B-CSE) program at the faculty of EEMCS. CI is a required course for the Data and AI track in the B-CSE program. It introduced three classes (reinforcement learning, evolutionary techniques, and neural networks) of CI techniques that can be applied to a variety of computational problems.
The most predominant assessment problem in the course	The course is assessed via practicum (50%) and a written exam (50%). Since CI is a large class, the exam includes multiple choice questions (MCQs) so that grading in practicable. However, a problem with the exam seems to be that several MCQs in the exam have a low discriminatory ability to distinguish good and poor performing students.

Table 5: Overview of the course

1. Overview of the assessment

I analyze data from the final exam of the CI course (Table 5) conducted in AY 2019--2020.

- The exam consisted of 36 multiple choice questions (MCQs) covering 7 learning objectives.
- The exam counted for 50% of the total grade.
- A total of 201 students took the exam.
- Each MCQ consisted of four options.
- Each MCQ was worth 10 points but the overall score was normalized to [0,10].
- The students had to achieve a grade >= 5.0 in the exam but a combined (practicum + exam) grade >= 5.8 to pass the course.

I choose to analyze this course because I am involved in teaching this course. I indent to incorporate the insights from this analysis in improving the assessment in the course.

2. Grade distribution and learning objective achievement

Figure 1 shows distribution of the grades of the 201 students who took the exam.

This was an easy exam, overall. All but four students received a passing grade (>= 5.0) in the exam. About half (99 out of 201) of the students received a grade >= 8.

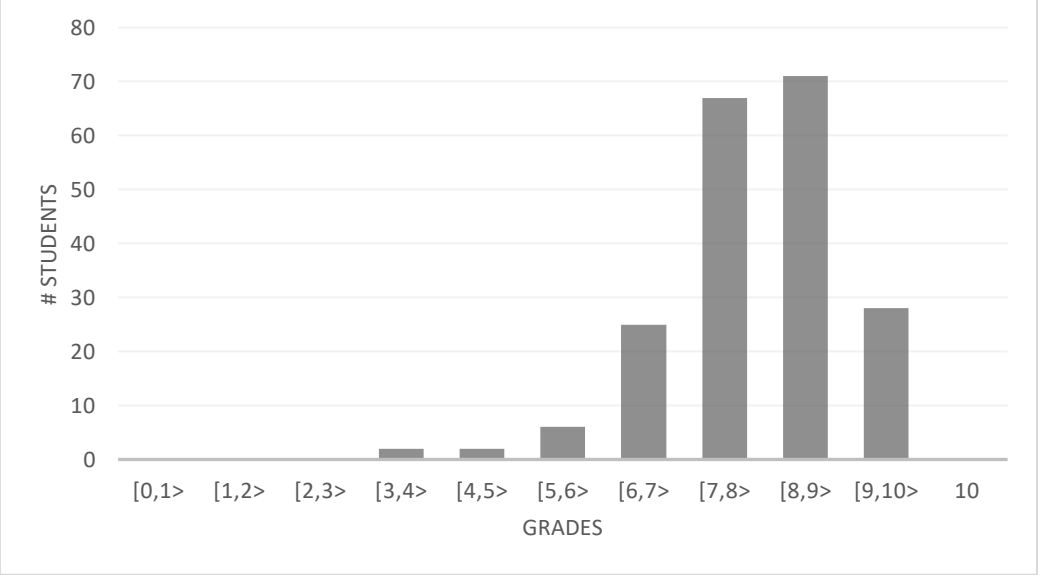

Figure 1: Grade distribution

Figure 2 shows the distribution of scores for each question in the exam via a boxplot generated via the BoxPlotR web tool (Spitzer, Wildenhain, Rappsilber, & Tyers, 2014). In each boxplot, center lines show the medians; box limits indicate the 25th and 75th percentiles as determined by R software; whiskers extend 1.5 times the interquartile range from the 25th and 75th percentiles, outliers are represented by dots; crosses represent sample means. The red lines in the figure separate the questions for each learning objective.

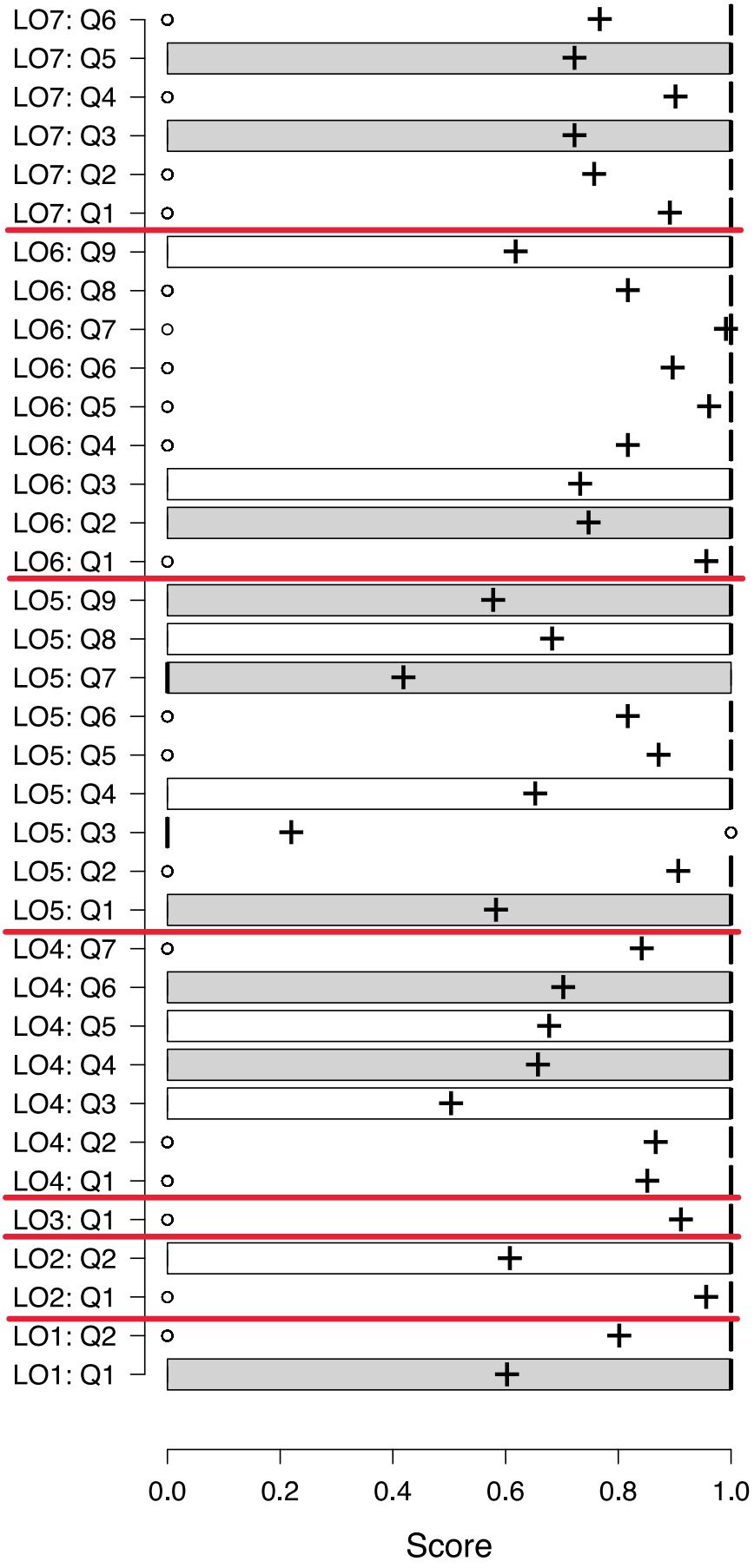

Figure 2: Score distribution per question, grouped (separated by red lines) per learning objective

Error! Reference source not found. shows the number of lectures, number of questions, mean difficulty (*p*), mean item-total correlation (*Rit*) for each learning objective. The learning objectives LO1—LO3 were about the introductory concepts covered in one lecture. The leaning objectives LO4—LO7 were about the main content in the course and each of these LOs was covered in one or more lectures.

Learning Objective	Number of lectures	Number of questions	Mean difficulty (p)	Mean item-total correlation (Rit)
LO1, LO2, LO3	1	5	0.76	0.27
LO4	2	7	0.72	0.28
LO5	4	9	0.64	0.32
LO6	2	9	0.83	0.33
LO7	1	6	0.79	0.34
Overall	**10**	**36**	**0.75**	**0.32**

Table 6: Number of questions, mean difficulty (p), and mean item-total correlation (Rit) per learning objective

3. Test reliability and item quality

Reliability: The Cronbach's alpha (α) for the exam was 0.71. This exam can be considered as medium stakes (Berkel, 1999) since it counted 50% for the final grade. Accordingly, the grades can be considered reliable since α is high enough (>= 0.7).

Although reliable, the exam has some problems. Below, I identify four major problems.

1. **Uneven distribution of questions**: The number of questions and the number of lectures per learning objective (shown in **Error! Reference source not found.**) are not aligned well. In particular, LO5, covered in four lectures, was assessed with nine questions, and LO6, covered in two lectures, was also assessed with nine questions. Similarly, LO4, covered in two lectures, was assessed with seven questions, and LO7, covered in one lecture, was assessed with six questions.

2. **Too easy exam**: The exam is easy, overall, with the average difficult of 0.75. That is, on average, 75% of the students gave correct answer to a question. Further, 12 out of 36 questions had a difficulty >= 0.9. In particular, questions for LO6 and LO7 were too easy. Almost all (except four) students passed the exam, which is great. However, a large number of students (98 out of 201) received a grade >= 8. So, it is likely that the exam does not distinguish good students effectively.

3. **One very difficult question**: One question, LO5: Q3, was too difficult (*p* = 0.22). That is, only 22% of the students gave correct answer to this question.

   The following is the difficult question. The corrected answer is in bold. The numbers in red in the brackets show the percentage of students selecting that answer.

   LO5: Q3. Which of the following statements about the standard backpropagation algorithm is FALSE?

a. Backpropagation computes the gradient of the loss (objective) funtion with respect to the weights of the neural network. (7%)
b. Backpropagation reduces the amount of operations by reusing the results of previous gradient computations. (42%)
c. Backpropagation can be parallelized and executed on a GPU. (26%)
d. Backpropagation uses numerical differentiation to estimate partial derivatives. (22%)

4. **Ineffective distractors**: For several questions, the distractors were ineffective. The following is example of such a question. Its difficulty was 0.96. A problem with this question is that it is very easy to discard each distractor. This was the pattern for many questions, especially the easy questions in the exam.

LO1: Q1. The main difference between regression and classification is:

a. regression cannot be done with neural networks. (1%)
b. regression is unsupervised while classification is supervised learning. (2%)
c. targets of a classification problem are discrete, while regression targets are continuous (96%)
d. there is no difference, apart from the name. (1%)

4. Reflection: reliability and item improvement

Below, I reflect on potential ways to solve the problems identified in the previous section.

1. **Uneven distribution of questions**: In Table 7, I suggest a distribution of questions, which is aligned with the number of lectures (learning activities) better than Table 6.

Learning Objective	Number of lectures	Number of questions
LO1, LO2, LO3	1	4
LO4	2	7
LO5	4	14
LO6	2	7
LO7	1	4
Overall	**10**	**36**

Table 7: Suggested distribution of questions per learning objective

2. **Too easy exam**: The difficulty of the exam should be increased in order better distinguish good performing students from poor performing students. The questions on LO1—LO3 can be easy because they are introductory concepts. The questions on LO5 are at an appropriate difficulty level. The difficulty of questions on LO4 can be slightly increased. Importantly, the difficult of questions on LO6 and LO7 should be increased significantly.

3. **One very difficult question**: A potential problem with the difficult question is that it is not clear and concise. Further, the answers test more than one thing. For example, most students chose the option “Backpropagation reduces the amount of operations by reusing

the results of previous gradient computations" as the correct answer. In this question: (1) is it that backpropagation does not reduce the amount of operations? Or, (2) is it that the amount of operations is not reduced because of reusing the results of previous gradient computations? Similarly, for the correct answer "Backpropagation uses numerical differentiation to estimate partial derivatives", (1) is it that backpropagation does not use numerical differentiation but some other type of differentiation, or (2) is it that it does not compute partial derivatives?

4. **Ineffective distractors**: A problem with distractors in this exam is that they are not attractive as shown by the example in the previous section. The exam should include more plausible distractors in order to increase their attractiveness and prompt students to think. The following is an example of a question from the exam that has good distractors.

LO6: Q9. Consider that you are evolving a LISP program using Genetic Programming. What does the initial population consist of?

a. The set of terminals (input variables). (11%)
b. The binary encoding of a random LISP program. (14%)
c. A set of symbolic expressions (s-expressions). (60%)
d. The set of primitive functions the LISP program can apply to the terminals. (11%)

PART C: DESIGNING ASSESSMENTS AND GRADING GUIDES: EXAMS

In this part, I analyze the Computational Intelligence (CI) course summarized in Part B (Table 5).

1. Constructive alignment check using an assessment matrix

Table 8 shows the assessment matrix for the final exam in the CI course. The Q column indicates the number of questions, and the P column indicates the corresponding points.

Learning objective	BLOOM'S COGNITIVE LEVELS												Total points & % of total score	Time spent (% of total)
	Remember		Understand		Apply		Analyse		Evaluate		Create			
	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P		
LO1 LO2 LO3	1	10	4	40									13.9	10
LO4	2	20	4	40	1	10							19.4	20
LO5	3	30	3	30	3	30							25	40
LO6	3	30	4	40	2	20							25	20
LO7	2	20			4	40							16.7	10
Total	11	110	15	150	10	100							**100%**	**100%**

Table 8: Assessment matrix

Time spent vs. Total points. There are discrepancies between the time spent and points allotted per LO. In particular, 40% of the time is spent on LO5, but only 25% of questions are about LO5. In contrast, for LO6 and LO6, there are more questions than the time spent on those LOs. For LO1—3, and LO4 the number of questions is proportional to the time spent on those LOs.

Bloom's cognitive levels: Questions vs. LOs.

- LO1 and LO2 are stated at the Bloom level "understand" whereas LO2 is stated at the Bloom level "apply." However, given that LO1—LO3 are about introductory concepts, LO2 should have been stated at the "understand" level as follows.
    - LO2: Apply the most appropriate CI technique for a given problem
    - LO2: Recognize the most appropriate CI technique for a given problem

  With the updated LO2, the questions for LO1—LO3 are appropriate for their intended Bloom level.

- LO4—LO7 are stated at the Bloom level "apply." For each of these LOs, there is at least one question at the "apply" level and the remaining questions cascade to the lower levels of "understand" and "remember." The cascading is reasonable but the number of questions at the "apply" level is too few for LO4, LO5, and LO6.

2. Designing or improving exams

Table 9 shows an improved assessment matrix for the final exam of the Computational Intelligence course, which addresses the problems observed in the previous section.

Learning objective	BLOOM'S COGNITIVE LEVELS												Total points & % of total score	Time spent (% of total)
	Remember		Understand		Apply		Analyse		Evaluate		Create			
	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P		
LO1 LO2 LO3	1	10	3	30									11.1	10
LO4	1	10	2	20	4	40							19.4	20
LO5	2	20	4	40	8	80							40.0	40
LO6	1	10	2	20	4	40							19.4	20
LO7	1	10	1	10	2	40							11.1	10
Total	6	60	12	120	18	180							**100%**	**100%**

Table 9: Improved assessment matrix

Summary of Changes in the Assessment Matrix:

Two main changes in the improved assessment matrix compared to the original assessment matrix are:

1. The number of questions for each LO is better aligned with the time spent for the LO.
2. For LO4—LO7, there are more questions at the Bloom level "apply", which is the intended Bloom level for each of these LOs, compared to the original matrix.

The following is a prototype of the exam with instructions and four sample questions. The exam was originally conducted on an online platform. The details are red are updated or newly included.

Exam Details:

Course: Computational Intelligence (CSE 2530)
Instructors: Dr. P.K. Murukannaiah, C.R.M.M. Oertel genannt Bierbach, Dr. F.A. Oliehoek
Term: 2019/2020
Exam start date: Fri, Jul 3, 2020 9:30:00
Exam end date: Fri, Jul 3, 2020 11:30:00

Exam Instructions:

- Write your name and email ID in the first page.
- This exam has 36 multiple-choice questions.
- Select one answer for each question.
- For each question, you receive 10 points for correct answer and 0 points for incorrect answer. Partial credits are not given to any question.

- You have a total of 120 minutes to complete the exam.
- The final grade is computed using the following formula so that minimum grade is 1.0 and maximum grade is 10.0, and correct answer due to random chance is accounted for.
  RawExamGrade = (PointsEarned / Total Points) * 10
  ActualExamGrade = maximum (1, (RawExamGrade − 10) / 30) $*$ 9 + 1

Code of Honour:

I will not use unauthorized help from other people or auxiliary materials for completing my exam. I will create the submitted answers all by myself during the time slot that is allocated for this exam.

Oral Check:

Please be aware that it is required to enroll for an oral check.

- The oral checks will take place in the 1.5 hours after the exam (from 11:30 to 13:00).
- You should claim a time slot of 10 minutes for your interview through the Queue: https://queue.tudelft.nl/lab/1773
- During each of the timeslots, we will randomly select as many of you as possible for an interview. The interviews will be conducted by one of the lecturers.
- **Failing to claim a time slot will invalidate your exam grade!**

If you have not yet enrolled for an oral check on queue. Do so now.

Exam Questions:

The following are four sample questions from the exam. The exam includes 36 questions in total.

Q1. The main difference between regression and classification is:

A. regression cannot be done with neural networks.
B. regression is unsupervised while classification is supervised learning.
C. targets of a classification problem are discrete, while regression targets are continuous.
D. there is no difference, apart from the name.

Q1. What is the main difference between regression and classification?

A. regression cannot be done with neural networks.
B. regression is unsupervised while classification is supervised learning.
C. targets of a classification problem are discrete, while regression targets are continuous.
D. there is no difference, apart from the name.

Q2. Sarsa is a reinforcement learning method. In Sarsa the update is defined as:
$Q(s_t,a_t) \leftarrow Q(s_t,a_t) + \alpha[r_{t+1} + \gamma Q(s_{t+1}, a_{t+1}) - Q(s_t,a_t)]$.
Which of the following statements is TRUE?

A. Given a fixed policy, Sarsa does not converge to the Bellman equation.
B. Sarsa learns values for the best possible actions in each state.
C. A high γ favors learning of long term rewards.
D. A high α favors fast convergence towards an optimal solution.

Q3. The `schema theorem' for genetic algorithms:

A. guarantees convergence of the algorithm towards an optimal solution.
B. guarantees that the number of schemas with above average fitness increases over the next generations.
C. guarantees that the number of solutions with above average fitness increases in the next generation.

D. guarantees convergence of the algorithm within a finite number of generations.

Q3. What does the `schema theorem' for genetic algorithms guarantee?

A. the convergence of the algorithm towards an optimal solution.
B. the increase in the number of schemas with above average fitness over the next generations.
C. the increase number of solutions with above average fitness in the next generation.
D. the convergence of the algorithm within a finite number of generations.

Q4. Which of the following statements about Bidirectional Associative Memory Networks (BAMNs) is FALSE?

A. In a BAMN inputs x and outputs y must have the same number of elements.
B. BAMNs use Hebbian learning to store new input-output patterns $\langle x,y \rangle$.
C. The weight matrix W can be computed as the summation of the correlation matrices of all the input-output patterns, $\langle x,y \rangle$, that we want to store.
D. For a BAMN to work well all the stored input-output patterns $\langle x,y \rangle$ must be equilibrium points (fixpoints) of the dynamical system.

Post Exam:

As this was a very unique exam, we would like to hear what you think about this format.

If you have any feedback about your experience with this exam, please indicate below.

Summary of Changes in the Exam Prototype:

- Added explicit course details to the exam.
- Added explicit exam instructions.
- Reformulated two MCQs (Q1 and Q3) so that the stem is phrased as a question instead of a statement.

3. Answer model and grading

Answer Key:

Q1. C
Q2. C
Q3. B
Q4. A

Grading Instructions:

- There is only one correct answer for each question.
- The answer key indicates the correct answer for each question.
- Each correct answer is worth 10 points.
- For each answer a student may receive 10 points or 0 points, but no partial credit.
- Calculate a **RawExamGrade** as **(PointsEarned/TotalPoints) * 10.**

4. Description of the evaluation process, feedback, and grade calculation

Grade Calculation:

The actual exam grade is computed from the raw exam grade using the following formula.

ActualExamGrade = maximum (1, (**RawExamGrade** − 10) / 30) ∗ 9 + 1

This formula ensures that the minimum grade is 1.0, not 0.0. Further, this formula accounts for the fact that there a 25% (one out of four) random chance of marking the correct answer. That is, if a student receives an raw exam grade of 2.5, the corresponding actual grade will be 1.0.

A student who gives correct answers to all questions will get the ActualExamGrade as 10.0.

A student must receive an actual grade of at least 5.0 to pass the exam. The exam accounts for 50% of the final course grade. A student must receive at least 5.8 course grade to pass the course.

Evaluation Process:

- The online exam environment (weblab) automatically computes a grade right after a student completes the exam.
- The grades are hidden until the responsible lecturer for the course analyses the students' submissions.
- The responsible lecturer will check students' feedback on potential mistakes in the exam and questions that a majority of the students gave incorrect answers to. If there are any mistakes in the exam, the lecturer will exclude the question from the grade calculation.

Feedback:

- The answer key is released along with the grades.
- A common discussion session is scheduled, where students can ask questions about the answer key. If this discussion leads to changes in the answer key, the grades are recalculated.
- The final grades are released to the students on the online environment (weblab).

Summary of Changes:

The common discussion session was not conducted in the 2019/2020 term, but will be introduced in the 2020/2021 term onwards.

PART D: REFLECTION ON THE IMPACT OF UTQ ASSESS

1. Summary of changes

The following are the three key changes I made to the final exam of the Computational Intelligence course analyzed in Part B and Part C of this PoC.

1. **Redistribution of the number of questions per LO**: The original number of questions per LO in the assessment matrix in Table 8 is misaligned with the time spent per LO in the course. The updated assessment matrix in Table 9 distributes the questions proportional to the time spent per LO. This improved increases the **validity** of the exam.

2. **Adding more challenging questions to the exam:** With the average difficult of 0.75, the previous exam was relatively easy. The questions for LO6 and LO7 were, in particular, too easy (**Error! Reference source not found.**). The improved exam includes questions that test students' knowledge at a deeper (and yet aligned with the intended Bloom level of the LOs). This increases the **reliability** of the exam, so that only students who master the LOs can receive a good grade. As a future improvement, I am discussing with the instructors the possibility of making the exam a combination of multiple-choice and open-ended question.

3. **Adding explicit exam instructions:** The updated exam prototype include explicit instructions about the exam, including grade calculation, which was missing in the previous version. This improvement increases the **transparency** of the exam.

2. Impact on assessment

So far, I have been developing assessment tasks in my courses intuitively but informally. The UTQ Assess module has provided me formal methods to reflect on and improve my assessment practice. In particular, I intend to use the following methods in designing assessments.

1. **Assessment plan:** Before UTQ Assess, I did not formally develop an assessment plan (e.g., Table 4). However, I now know how to do this. The assessment plan was particularly useful for me in realizing that my formative and summative feedback did not align, i.e., for some LOs, I was not giving formative feedback at all. I can now correct this because of formally developing an assessment plan.

2. **Test result analysis:** Before UTQ Assess, I did not do an extensive analysis of the test results. Specifically, I used to analyze difficult questions in the exam, but did not pay attention to easy questions. Also, I did not break down my analysis per LO. The extensive analysis I did in Part B of this PoC helped in realizing problems that I would not have realized otherwise. In particular, I found that the exam (specifically, questions about some LOs) was too easy, reducing the reliability of the exam.

3. **Assessment matrix:** Before UTQ Assess, I did not formally develop an assessment matrix. However, developing (Table 8) and refining (Table 9) the assessment matrix has helped in increasing the validity of my assessment by aligning the time spent on an LO and the number of questions asked about it in the exam.

3. Impact on Vision on Education

Table 10 (excluding text in red) is the vision on education I developed after UTQ Develop, but before UTQ Assess. As can be seen, my vision was mainly about developing and teaching courses; assessment did not really feature in my vision on education. After UTQ Assess, I recognize how tightly intertwined learning objectives, learning activities, and assessment are. As a result, I have updated my vision on education as shown in the red text in Table 10.

Developing my Vision on Education		
How I believe students learn best	I believe students learn best when they are in the "flow channel," i.e., when they perceive the material they are learning as neither too easy (which leads to boredom) nor too difficult (which leads to anxiety).	
How I can enable students to learn successfully	Qualities that I need as a teacher	Expertise in the field Designs active, effective, and efficient learning methods, learning materials, and assessment tasks Provide formative and summative feedback Adapts teaching based on reactions and needs of the students
	Methods that I would like to use in my teaching	Active learning Emphasis on foundational concepts Balancing theory and practice Assessment planning and test result analysis
	The role of my research in teaching	I often teach courses in my research area, which helps me in presenting both foundational as well as state-of-the-art concepts Even when I teach courses outside my research area, my research experience helps inculcate a critical thinking attitude in students
	My short-term and/or long-term plans	Short term: Develop, teach, and assess a course in 2020. Complete UTQ modules, understanding different education theories. Long term: Diversify my teaching portfolio—develop/teach/assess more courses and participate in curriculum development for new programs. Articulate a teaching vision based on my own experience.

Table 10: Pradeep Murukannaiah's vision on education

REFERENCES

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TU Delft
Teaching & Learning Services

Certificate

ASSESS

The lecturers of the course ASSESS certify that:

Pradeep Murukannaiah

has completed the course ASSESS 2011.

The workload of the course is 40 hours.

Delft, 26 October 2020

Erna Engelbrecht

Feedback form UTQ ASSESS

Participant:	Pradeep Murukannaiah	Course end date:	26/10/2020
Trainer:	Erna Engelbrecht	PoC submission date:	02/11/2020
Module code:	UTQ Assess 2011	PoC completion date:	02/11/2020

BASIC CRITERIA FOR COMPLETING THE PoC		
Identification	Name, date and group on first page	✓
PoC is on par with basic academic standards for report-writing	Page numbering, numbered The document is written in full sentences (unless otherwise stipulated in instructions) Captions included for all figures and tables. Proofreading and spell checking has been done. At least 4 references are included in the document. It is suggested to include references on at least the following topics: • Constructive Alignment, • Quality Requirements for Assessment, • rules and regulations documents, • Educational Theory or Interpretation of your assessment data.	✓
Readability	PoC is understandable for non-experts. The text is well-structured. Irrelevant sections and text, and highlighted instructions and have been removed.	✓
Learning objectives	The learning objectives are formulated in such a way that it is practical to assess them.	✓
	Feedback from trainer is addressed.	✓
Use of feedback	Feedback is responded to, either through implementation, or by justifying why something is not implemented.	✓
Clean-up	The blue instructions have been deleted from the template.	✓

PART A: CONSTRUCTIVE ALIGNMENT		
LO1. Design and improve the assessment plan of a course. The design choices or improvements of an assessment plan are based on alignment, on the quality requirements for assessment and on applicable regulations, and lead to improvements.		✓
1. Introduction to the course	The table Overview of the course has been completed and described briefly.	✓

2. Assessment plan for the course	All the relevant fields in the table are completed. The course assessments comply with the following: LOs are assessed using the relevant assessment methods, and there is a balance between formative and summative assessment. If not, these should be addressed in the Reflection and improvements must be indicated in colour in the table. The minimum grade(s) needed to pass the assessments/course are explained. It is clear for which of the assessments the students can do a resit/addition in case they fail, and if not, why.	✓
3. Description of the assessment plan table	A brief description is provided to explain certain things in the table that might not be clear or apparent at first glance, as well as any changes that are being/will be made.	✓
4. Critical reflection on constructive alignment: suggestions for improvement	4.1 Assessing all the learning objectives using relevant assessment methods: Appropriate assessment methods are used to assess each of the learning objectives, at the right cognitive level.	✓
	4.2 Balancing formative and summative assessments: All LOs are tested both formatively with feedback, and summatively.	✓
5. Assessment regulations and guidelines	In line with the relevant faculty regulations and guidelines. Where there is noncompliance, this is discussed briefly. At least two Articles/Sections are included in the discussion	✓

PART B: TEST RESULT ANALYSIS		
LO2. Use test results to assess whether students master all learning objectives, and if not, analyse the cause.		✓
Overview of the course	If a different course is discussed, the table: Overview of the course is completed. If the same course is used as in Part A, the table is deleted.	✓

1. Overview of the assessment	The table is completed to give an overview of the assessment of which the data is analysed.	✓
2. Grade distribution and learning objective achievement	Graphs indicating the distribution of the student grades, and the score distribution per LO. Achievement of the LOs is described.	✓
LO3. Use test result analysis to assess the quality of test items, decide on alterations in grade calculation and on which items need improvement.		✓
3. Test reliability and item quality	A test result analysis is used to determine the four most problematic test items, based on, for example, the p-value, maximum achieved score, Rir and, in case of closed questions, a. If applicable, the reliability (Cronbach's alpha) is also discussed.	✓
4. Reflection: item improvement	The possibility of adjusting scoring, and if relevant, implemented.	n/a
	The grade distribution is shown and discussed after the score-grading conversion has been changed, if applicable.	n/a

PART C: DESIGNING ASSESSMENTS AND GRADING GUIDES - EXAM		✓
LO4. Design and improve blue prints of different types of test: exam		✓
Overview of the course	If a different course is discussed, the table: Overview of the course is completed. If the same course is used as in Part B, the table is deleted.	✓
1. Constructive alignment check using an assessment matrix	The assessment matrix shows the relation between learning objectives and cognitive level and the (sub)question's weight. The division of points between learning objectives is compared with the practice time. If there is a misalignment, this is discussed and suggestions for improvements are listed/and indicated in colour. Received peer feedback is taken into consideration.	✓
LO5. Design and improve different types of tests: exam		

2. Designing or improving exams	Four sample (sub)questions are included that show improvements made. Received peer feedback is taken into consideration.	✓
	If applicable, the original and a prototype of the new assessment is attached.	✓
	The changes are discussed briefly.	✓
LO6. Design and improve answer models and grade calculations of tests: exam		
3. Answer model and grading	The answer model and the instruction for graders of the exam are critically analysed and improved (and if non-existent, designed).	✓
4. Description of the evaluation process, feedback, and grade calculation	The grade calculation of the exam is explained and it is analysed whether the cutoff point is at the expected level of just-pass students.	✓

PART D: REFLECTION ON THE IMPACT OF UTQ ASSESS		
LO7. Reflect on the quality of an assessment, based on the quality requirements for assessment.		
1. Summary of changes	A summary of changes in terms of the quality requirement of assessment (validity, reliability, effectiveness, transparency, and practicability) is listed.	✓
2. Impact on assessment	The reflection includes a brief discussion on whether and how the ASSESS module will impact on your assessment practice.	✓
3. Vision on Education	A short discussion is included on how UTQ Assess has impacted in the participant's own Vision on Education.	✓

Proof of Competence **UTQ TEACH**

Participant:	Pradeep K. Murukannaiah	Faculty:	EEMCS
Trainer:	Ines Labarca Hoyl	Course end date:	11-02-2021
Module code:	TEACH 2101	Submission date:	12-03-2021

PART I. MINI-LECTURE (INSTRUCTIONS)

PART I. MINI-LECTURE

1.1 DESIGN: Learning objectives

LO1. At the end of this mini lecture, the student should be able to:

- **Compare** centralized and collaborative AI paradigms

1.2 DESIGN: Lesson plan

LO	Teacher activity: Description of activities (Instructions and emphasis)	Student activity: Description of activities (Instructions and emphasis)	Teaching aids (materials needed)	Duration	Time
Preparation:					
1	Post a link to a puzzle	Read about the puzzle	Wikipedia	10	--
Introduction:					
1	Warmup: Present examples of AI systems Post an online quiz	Listen Answer the quiz	Slides Mentimeter	2 2	2 4
Body – core of the lesson:					
1	Describe the types of AI systems Present a collaborative problem Synthesize the results from the activity	Listen, Ask clarification questions Solve the collaborative problem Participate in the discussion	Slides Google sheet Google doc	6 6 2	10 16 18
Closing – rounding off the lesson:					
1	Summarize the lecture, preview the next	Listen, Ask questions	Slides	2	20

Lesson plan summary:

- **Introduction**: I start the lecture by giving examples of AI systems, and ask students via a quiz what AI paradigms the provided examples follow. Based on students' responses

to this quiz, I engage students in discussing why they thought each example is centralized or collaborative. In particular, I focus the identifying basic misconceptions.

- **Body**: In the core of the lecture, I define centralized and collaborative AI paradigms, and highlight the differences. I refer back to the examples in the Introduction to help students in connecting definitions and concepts to real examples. Following my description, students engage in an active learning activity.
- **In-class and preparatory activities**: The active learning activity requires students, in groups of 4--5 to solve a balance puzzle. The solutions students develop can be thought of as how an AI system would solve the puzzle. The preparatory activity (provided to students prior to the class) requires students to solve the puzzle in a centralized AI paradigm. The in-class activity requires students to solve the puzzle in a collaborative AI paradigm. After solving the puzzle, students compare the two paradigms by answering the a few questions.
- **Closing**: In the closing, I will discuss the students' responses to the questions asked in the activity highlighting the common themes. I will close by summarizing the lecture and providing a preview of the next lecture.

Constructive alignment: In this mini lecture, the students learn to "compare centralized and collaborative AI paradigms." The introductory activity helps orients students in thinking about these paradigms from the onset. The core of the lecture describes the two paradigms theoretically. The active learning activity helps students learn to compare the two paradigms by applying the two paradigms to an engaging puzzle. Doing the same puzzle in centralized and collaborative paradigms helps students understand the differences between the two paradigms. The questions at the end of the puzzle help students in discuss and compare the two paradigms, and generalize their observations to AI systems, in general.

Interaction: The lecture includes three key opportunities for students to interact. (1) After the initial quiz, students are asked to discuss their answers with the class. (2) The active learning activity is to be performed in a group. Students interact with each other in this activity. (3) Students can interact with the lecturer anytime during the lecture by asking questions.

1.3. DESIGN: Learning activity description

Collaborative Problem-Solving Activity

Goal

In this activity, you will learn to compare centralized and collaborative AI paradigms and the challenges involved in collaborative problem solving.

Preparation

1. Read about the balance puzzle (hopefully, you did this prior to the lecture).
2. You will be assigned to a Zoom breakout room of size N+1.
3. Assign one person in the room as the moderator (this can be anyone, but if there is a TA/instructor in the room, they can play the role of the moderator). Treat each of the remaining N parties as an agent.
4. The moderator creates a Google spreadsheet and shares a link (with edit access) to all the members in the breakout room. Create three columns in the spreadsheet and call those: (1) Stand, (2) Left scale, and (3) Right scale.

Scenario

In the original balance puzzle, you have N coins (or balls) and there is centralized control. That is, one person can weigh the coins in a balance and reason about the outlier.

In this modified version of the puzzle, there is no centralized control. Thus, imagine that each coin is an intelligent agent. One of the agents is an outlier (i.e., it is either heavier or lighter than the other agents). Now, the agents have to collaborate to determine who the outlier is and whether the outlier is heavier or lighter than the other agents. Assume that no agent is malicious. You will do this activity in two settings: without and with communication.

Activity (Part 1): No communication

1. The agents cannot directly communicate with each other. Please play fair :-)
2. The moderator treats one of the agents as the outlier but does not disclose this information to other agents.
3. The agents make decisions in multiple rounds. In each round:
    a. Write each agent's name in the first column (Stand).
    b. An agent has three options:
        a. do nothing (stay on the stand)
        b. jump to the left scale, or
        c. jump to the right scale.
    c. At the end of the round, the moderator writes one of the three possibilities about the balance:
        a. balanced,
        b. left heavy, or
        c. right heavy.
    d. Each agent observes moderator (the moderator is like the environment) and reasons about the outlier.
    e. If an agent finds the outlier, they can speak up and the moderator will indicate if that is correct or not. If an agent made the correct inference, the task end.
    f. If no agent made correct inference, start a new round by adding new rows (do not overwrite; the history may be needed for reasoning).
4. Stop after the allocated time. Monitor the time in the breakout room for this.

Discuss

1. Can this problem be solved without communication?
2. Were you able to solve the puzzle? How many rounds did it take?
3. What algorithm did you follow?

Activity (Part 2): With communication

Attempt to solve the task again but this time you can communicate with each other. The rest of the rules are the same. What you can communicate is up to you.

Discuss

1. How did the communication help?
2. Were you able to solve the puzzle? How many rounds did it take?
3. What algorithm did you follow?

Report

1. What are the challenges involved in engineering a collaborative AI system?
2. What novel application scenarios does collaborative AI open up?

Write your response in the following Google document.

https://docs.google.com/document/d/1PzPW5kmjxMIYPwfQPpOef-a7T44CZrJSvdGZiXBepGk/edit?usp=sharing

If someone already wrote something you are thinking about, put a +1 next to that comment.

Guiding students in the activity

To guide the students in the activity, a lecturer or a TA will join the breakout rooms intermittently. The instructions for the activity are always available in a shared document.

Potential problems

Although it is an engaging activity, it can be time consuming. In particular, if students did not perform the preparatory activity and are not familiar with the balance puzzle, students may not immediately understand what the activity is.

2.1 Evaluation mini-lecture: lessons learned

Overall, the mini lecture was well received by the students. The following are my key observations.

- The students liked the introductory activity (quiz). This activity helped the students in relating the concepts taught later in the lecture to concrete examples of AI systems.
- The students also liked the active learning activity. The activity is not only appropriate in helping student achieve the learning objective but is also fun and engaging.
- Some students felt the pace was fast at times. The students would have liked me to pause from time to time to check on the students' understanding. In particular, I could have paused more when describing the theoretical concepts as that was most complex part of the lecture. After reflection, I recognize this is definitely something I can accommodate.
- Some students felt that I could have described the technical terms and jargon better. Some of these concepts are fundamental in my field and I assumed students to be familiar with these concepts. However, I recognize that could have checked this assumption by asking student if they are familiar with these concepts and described them if need be.
- Some students felt that the flow of my lecture could have been better. In particular, the students found the transitioning between tools (slides, mentimeter, and URLs to Google spreadsheet and documents) difficult. This is a problem mainly because of the limitation of the online platforms available for teaching. Some advanced tools which integrate multiple features

do not scale (or having licensing limitations) for a large number of participants. Other tools the scale to a large number of participants have minimal features. Thus, I relied on different tools.

2.2 Evaluation mini-lecture: DAKI

- **Drop**: I made assumptions about students' entry levels, in particular, about the foundational terms and concepts, but did not check if all students were at the entry level I assumed. I should drop this assumption, and explicitly check with students whether or not they are the entry level I expect them to be at.
- **Add**: More pauses in the lecture and checking students' understanding from time to time. In particular, I should add longer pauses after introducing key and nontrivial ideas.
- **Keep**: Active learning activities that not only serve the purpose of achieving learning objectives but are also engaging and fun for students.
- **Improve**: Time management. I was too ambitious with the mini-lecture, especially with the activity I chose. The activity was well received by the students, but it took longer than I expected. Because of this, my lecture took longer than it was suppose and also, I did not have sufficient time for a discussion during the closing of the lecture.

PART II. REAL LIFE SESSION

PART II. REAL-LIFE SESSION

1.1 DESIGN: Learning objectives

LO1. At the end of this lecture, the student should be able to:

Compare centralized and collaborative AI paradigms

1.2 DESIGN: Lesson plan

Since the learning objective for the real-life lecture was same as that of the mini lecture, I used a lesson plan with the same structure as the mini lecture. However, I spent more time on activities and introduced the concepts in more depth than the mini lecture.

LO	Teacher activity: Description of activities (Instructions and emphasis)	Student activity: Description of activities (Instructions and emphasis)	Teaching aids (materials needed)	Duration	Time
Preparation:					
1	Post a link to a puzzle	Read about the puzzle	Wikipedia	30	--
Introduction:					
1	Warmup: Present examples of AI systems Post an online quiz	Listen Answer the quiz	Slides Mentimeter	5 5	5 10
Body – core of the lesson:					

1	Describe the types of AI systems Present a collaborative problem Synthesize the results from the activity	Listen, Ask clarification questions Solve the collaborative problem Participate in the discussion	Slides Google sheet Google doc	10 10 5	20 30 35
Closing – rounding off the lesson:					
1	Summarize the lecture, preview the next	Listen, Ask questions	Slides	10	45

The summary of the lesson plan, the activities, constructive alignment, and interaction opportunities are same as in the mini lecture (Part 1, Section 1.2).

1.3. DESIGN: Learning activity description

I used the same activity (collaborative problem-solving activity) as in the mini lecture (Part 1, Section 1.3). The main difference is that student had more time for the activity (15 minutes in real-life lecture as opposed to 8 minutes in the mini lecture).

2.1 Evaluation mini-lecture: lessons learned

I improved the lecture in the real-life session based on feedback from the mini lecture, and it helped in several ways. I collected students' feedback for my real-life lecture on Google form. The following are my key observations based on self-reflection and feedback.

- This lecture was quite ambitious for a 20-minute session of the mini lecture. The longer real-life lecture session made a big difference. I had more time to engage with students, check understanding, and answer questions. The extra time also helped students in the activity.
- I made sure to explicitly ask students if they are following me at several points in the lecture. Students asked me several questions throughout the lecture, and I answered them. Students seem to life this. For example, one student commented in the feedback "I enjoy how you answer questions to try to clear up the confusion."
- I also improved the pace of my lecture based on the feedback from the mini lecture. I explicitly asked the students to interrupt me if I go too fast during the lecture. In fact, at one moment a student interrupted me and asked me to be slow on a particular topic. Eventually, the students seem to like the pace. For example, one student commented: "Very clear slides; all relevant information was on them, and a clear structure was laid out. Pace was very easy to follow, and plenty of examples helped understanding." There is still room for improvement here. Some students still commented that the lecture was too fast at times.
- This was an online lecture. I encourage students to ask questions by speaking up or in the chat window. I was surprised that students did not ask questions directly (by speaking up). Instead, they ask a lot of questions in the chat window. This was a bit challenging. I had to look at my slides as well as keep an eye on the chat window. It seems students prefer this and like when the lecturer answers questions on the chat window. For example, one student commented: "Lecture was very nice, easy to follow had nice demonstrations like videos and showed how the

code worked with a nice demo. Also always answers all questions posed and says if he doesnt know the answers to a question which is good!"

- Although some students liked that I answered all questions in the chat window, some felt that it was not necessary. For example, one student commented: "I think you should give us more break time by perhaps moving on instead of answering every question." This is a good comment and I realize that answering questions too frequently can break the flow for some students. Instead of answering questions in the chat window as they come, I should instead look at and answer the questions in the chat window during transition points in the lecture.

2.2 Evaluation mini-lecture: DAKI

- **Drop**: One student commented "I think you said "uh" quite a few times. It not that bad, but maybe a tip/obersvation." I have also noticed this and agree that I should drop the "uh"s. This is difficult but I try to continually improve my speaking.
- **Add**: More complex examples to the mix. One student commented: "Some of the examples could be made more complicated." I chose several examples that make it easy for most students to follow. However, I realize that I should include some complex examples in the mix, which advanced students will appreciate.
- **Keep**: I will definitely keep multiple channels (e.g., directly asking by speaking and using a chat application) for questions. I will keep this not only for online lectures but also for in-person lectures in the future. I realized that many students do not speak up but ask question in the chat format. This probably help students to formulate their questions better. This also gives an opportunity for other students in the class and the TAs to answer questions.
- **Improve**: Time management. This is the same issue I identified for the mini lecture as well but for a different reason. In the mini lecture, I was too ambitious in choosing the content and activities. I rectified that by allocating more time in the real-life session. However, I still took longer than I was supposed to for the lecture because I tried to answer questions in the online chat window as and when they come. Instead, I could have waited for transition points and answered questions in the chat window, then. This would have reduce the time I took as well as made the lecture flow smoother for students.

PART III. CONCLUSIONS

PART 3: CONCLUSIONS

1. Lessons learned and/or inspiration gained from participating in the mini-lectures.

By participating as a student in my peers' mini lectures, I learned the following key lessons.

- The introductory part of a lecture is very important. If the introduction piqued my interest, I was very engaged in the remainder of the lecture.

- Making explicitly what is the learning objective for the lecture is important. In some sessions, this was not clear and that made wonder about the purpose of different activities.
- The lecturer's enthusiasm affects students' enthusiasm. Some lectures were too monotonic, and I was not very engaged in those lectures. In contrast, when the lecturer was energetic, I felt quite enthusiastic as well.
- Time management is important. I observed that most lectures, including mine, went over time. Perhaps, most of us include more content than we can cover in a lecture.
- Having intermittent quizzes and activities is a great idea. Most mini lectures did this. This not only forces students to check their understanding but also engages students who may not have long attention spans.

2. Main take-aways from this module

- **Change in teaching vision**: This module changed my fundamental style of teaching. Before this module, typically, my goal was to deliver as much content as possible in a lecture. I was expecting students to absorb as much knowledge as possible in a lecture and do other activities outside the lecture to reinforce that understanding. I think this approach works for students who are self-motivated and spend a lot of time outside the lecture for preparation and revision. However, for a large number of students, I realize that this approach may not work. After the TEACH module, I realize how important it is to make the lectures interactive, and activity oriented. I think approach motivates students on the subject, which can lead them to further explore the subject. Of course, there is a trade-off. With more activities and interaction, I cannot teach as much content as I could do otherwise. However, I think this is fine. I can make the additional content as homework, assignments, or additional readings.
- **Teaching strengths**: My key strength as a teacher is my knowledge of the subjects I teach. I understand the foundations of these subjects as well as the state of the art. This helps in teaching both foundational and advanced topics in the subject. Even if I am teaching an introductory course, there are always some students who want to go beyond the basics. The knowledge and mastery also reflect in the confidence with which I teach.
- **Areas for improvement**: The TEACH module also helped in realizing some areas for improvement as a teacher. First, sometime the pace of my lectures is too fast for some students. I realize that I should slowdown and pause from time to time. Second, I usually expect students to have a certain entry level for a lecture but do not check that explicitly. I realize that sometime students do not know some basic terms or concepts I expect them to know at a certain point. I should check this explicitly and refer students to additional material if they are not familiar with the basics. Finally, I should do better time management in my lecture. In general, I take longer than I hope to in my lectures. I realize that this problem is related to the "change in vision" I talked about in the first bullet. I usually try to deliver a large amount of content in a lecture. Instead of this, I am working on reducing the content, and making the presented content more interactive and active learning oriented.

TU Delft
Teaching & Learning Services

Certificate

TEACH

The lecturers of the course TEACH certify that:

Pradeep Murukannaiah

has completed the course TEACH 2101B.

The workload of the course is 40 hours.

Delft, 11 February 2021

Danika Marquis

UTQ Coordinator
Teaching & Learning Services
Delft University of Technology

Feedback form **UTQ TEACH**

Participant:	Pradeep K. Murukannaiah	Course end date:	
Trainer:	Inés Labarca	PoC submission date:	12-03-2021
Module code:	TEACH 2101	PoC completion date:	07-04-2021

INSTRUCTIONS: HOW TO USE THIS DOCUMENT

This document is used by the trainer to give feedback on your PoC. The trainer will use the document to comment on your work, advise on how to improve your teaching, and indicate if improvements need to be made to your PoC. The following symbols to indicate whether you have reached the pass-level:

✓ Criterion has been met satisfactorily. No additions are needed.

X Needs adjustments or is missing. Please write all additions in a different colour so that it is easy for the trainer and the final evaluators to find.

KNOCKOUT CRITERIA		✓/X	TRAINER FEEDBACK	PARTICIPANT COMMENTS
Identification	Name, date and group on first page.	✓		

Referencing	Page numbering, numbered captions for all figures and tables.	✓		
Use of feedback	Feedback is addressed (when document is a revision).	✓/X		

PART A: EDUCATIONAL DESIGN		✓/X	TRAINER FEEDBACK	PARTICIPANT COMMENTS
LO1. The lecturer can design education based on the principles of 'constructive alignment'.		✓/X		
1.1 Learning objectives	Learning objectives are constructed so that they are specific and measurable; their level is appropriate to the place of the course in the programme.	✓	The LO you designed is concrete, measurable and realistic for your students (both in the minilecture, and during the real-life lecture designs). Also, the way it is written is simple, making it easy to understand.	
1.2 Learning activities	Show and discuss how modes of instruction are related to the learning objectives.	✓		
	Demonstrate that the learning objectives are fully covered in a valid and reliable manner.	✓	You clearly explain how the LO is covered with the learning activities you design.	
LO2. The lecturer can design active, effective, and efficient learning methods and learning materials.		✓/X		
2.1 Active learning	Describe an activating instructional method and assignment in the course that you have designed.	✓	In both of your lesson plans, you designed relevant and engaging exercises for your students to practice and interact with the teacher, content and each other. The activities are not only activating, but also allow you to monitor your students understanding and make sure to give them timely and relevant feedback. You also include polls at the beginning to address common misconceptions. These polls are a really good strategy, because they engage students, allow them to practice and give you valuable input on their understanding.	

3.1 Time allocation	Include a lesson plan showing how both lecturer and student activities (e.g. grading, giving feedback) can be dealt with realistically in the available time.	✓	Lesson plans have realistic time estimations, but sometimes fall short in the implementation. This is however, a point for improvement which you are currently working on.	
	Used learning materials are included in the appendix.	✓	Yes, everything from the minilecture is included. From what you mention, the setup used for the real-life lecture is very similar to the minilecture.	
2.2 Student instruction	Discuss how sufficient guidance for students to give direction to their learning activities is provided.	✓	Your lectures efficiently scaffold your students learning from beginning to end, constantly increasing in complexity. You guide your students by designing clear instructions for your activities. You also monitor the progress in different ways (e.g. using polls, offering the chat for questions, etc.) and give feedback to wrap up these activities. This helps students identify the key takeaways of the activity and identify gaps and strengths. When designing your education, you consider your students' diversity and offer them several ways for actively participating in the course (asking questions out loud, via the chat, etc). You also give students preparation material so that they can come better prepared to your session and make the most out of the interaction.	
LO3. The lecturer can design education in a practically and logistically feasible (do-able) way.				

PART B: TEACHING & SUPERVISING		✓/X	TRAINER FEEDBACK	PARTICIPANT COMMENTS
LO4. The lecturer can prepare an educational meeting.		✓		
4.1 Lesson plan	A lesson plan is created according to the constructive alignment principles.	✓	Lesson plan is carefully designed following constructive alignment principles.	

	The lesson plan fully describes the teacher activity, student activity, learning objectives, teaching aids and the duration of each activity.	✓	Very complete and clear lesson plans.	
LO5. The lecturer can conduct an educational meeting and reflect on his performance. An explicit performance of a teaching session by video or report of a live observation, which demonstrates:		✓		
5.1 Teaching	A clear explanation of the purpose and relevance of the teaching session to students.	✓	During both sessions, you implemented engaging and well-designed lectures. By breaking down a complex topic into small chunks, your make your lectures easy to follow and student centred. You also start by connecting with students previous knowledge and confronting them with their main misconceptions. This increases the relevance of	
	Skillful use of technical aids (if applicable).	✓		
	A clear explanation of the subject matter and instructions towards students.	✓		
	Real interaction with students in order to stimulate the learning process.	✓	the lectures, making them more stimulating since the beginning. You have a good eye for detail, taking care of the practical aspects, without losing the big picture: the purpose of your lecture. This ability helps you design meaningful lectures that prove to be feasible in their implementation.	
	A good and stimulating atmosphere.	✓		
LO6. The lecturer can supervise students, individually and/or in groups.		✓		
6.1 Feedback	Effective student feedback is provided during meetings with students.	✓	You follow up all your activities with timely, on-the-spot feedback moments. This increases the impact of your feedback and promotes students learning. You also show you are open and available for answering unplanned questions during the session.	

PART C + D: EVALUATING TEACHING	✓/X	TRAINER FEEDBACK	PARTICIPANT COMMENTS

LO7. The lecturer can analyse evaluation results, draw conclusions and pinpoint areas for improvement.		✓		
7.1 Evaluation	Teaching performance is evaluated, substantiated by own experiences, peer & trainer feedback.	✓	Very analysis of your teaching, both for the minilecture, and for the real-life lecture. All your conclusions are based on the concrete evidence (peers, instructor and student feedback, plus your experiences and observations). You thoroughly evaluate different aspects of your teaching, identifying your strengths and coming up with concrete and feasible ways to improve your teaching (e.g. slowing down the pace, addressing questions in the chat during transition moments, being less ambitious with what to cover during the synchronous session). I especially like your reflection on the assumptions you make on students' entry levels. It's great that you are becoming aware of this, because by checking your assumptions you can create more inclusive education where your students have more similar opportunities to learn.	
	Conclusions on performance are provided and are based on the evaluation.	✓		
	Suggestions for improvement are stated and are related to the conclusions.	✓		
	Lessons learnt from peers & conclusions	✓	Really good synthesis of your learning process during this module. I see connectedness and a clear storyline with the rest of the PoC. You describe your main take-aways from having participated in the minilectures and define your main strengths and points of improvement. I particularly liked your reflection on how your view on the role of the lecturer was transformed during the session. I see you have really understood what a student-centered teaching approach means. Indeed, the role of the teacher is to make learning happen, which requires considering how much the students can actually take in. I can totally relate to the difficulty of not being too ambitious and being able to manage time well during the session. This is for sure a challenge that improves with practice. However, having more student-centered lectures means there the uncertainty of how the group will interact during the session will increase. I personally find time buffers to be useful strategy when designing my lectures, as well as defining the minimum viable outcome I want to get out of the session. Putting your students in the	

			center usually works well as a compass that will point you in the right direction. Congratulations for your work during this module! I don't doubt that you will continue to develop yourself as a great educator, thanks to your commitment with your students learning and your search for continuously improving. Good job!	