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Teaching Portfolio

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Teaching Certifications

I hold the University Teaching Qualification (UTQ) certificate which is regarded as proof of the competence of teaching in academic settings in the Netherlands. My UTQ dossier can be found on my personal webpage. I have completed a number of pedagogical courses such as Teaching Skills, Designing Courses and Projects, Facilitating Learning, Assessment, Evaluation of Courses, and Supervision of PhD Students.

Teaching Philosophy

My personal vision in teaching primarily consists of the following aspects:

(i) **Student-oriented teaching** – As a teacher, I believe it is my responsibility to know who my students are, their existing knowledge, and their learning needs/goals. With this knowledge, I tailor my teaching style and content to fit the students. Toward this objective, I make use of active learning methods such as challenge-based learning, problem-based learning, etc.

(ii) **Inclusive and accessible education** – Research has shown that students perform better when diverse socio-cultural backgrounds of students are recognized and embraced within educational institutions. It is also worth noting that an inclusive approach not only improves the performance of students from underrepresented communities, but that of other students as well [1]. In order to provide diverse and inclusive teaching and supervision, I act according to the guidelines shown in Table 1

Principle	Activities
Establish positive class climate.	Learning names, in-class surveys and activities.
Set explicit expectations.	Clear assessment criteria, timely feedback.
Select diverse course content.	Use of multiple and diverse examples.
Design accessible course elements.	Use of dyslexia-friendly fonts (e.g. Arial).
Commitment to inclusion.	Self-inventory of biases, ways to overcome them.

Table 1: Guidelines for inclusive and accessible education

Below I expand on my teaching vision and some of the methods I use to implement it. For more details, please see my University Teaching Qualifications (UTQ) dossier.

Student-Oriented Teaching

I have completed a number of pedagogical certifications that have enabled me to teach using active learning methods including problem-based learning, project-based learning, challenge-based learning, etc. I also have extensive experience in various teaching delivery methods including in-person, online, hybrid, blended, etc.

(i) **Incorporating various forms of learning** – I try to incorporate different forms of learning to accommodate a variety of learners. The lecture slides are created using a consolidated color scheme and they contain illustrative figures to benefit visual learners. For auditory learners, I plan my lectures with scheduled questions and invite students to answer them. For hands-on learners, I recommend a few optimal assignments. If they do not understand any aspects of these assignments, I answer them promptly and also provide them positive feedback on the parts they managed to complete correctly on their own.

(ii) **Guided in-class mathematical analysis** – On speaking with some of my students from the course on reinforcement learning, I realized that some students lacked the experience to perform the mathematical analysis required as part of the learning objectives. To deal with this issue and to increase student interaction in the class, I included guided in-class mathematical analysis as a learning activity for the students. Students opined that this learning activity

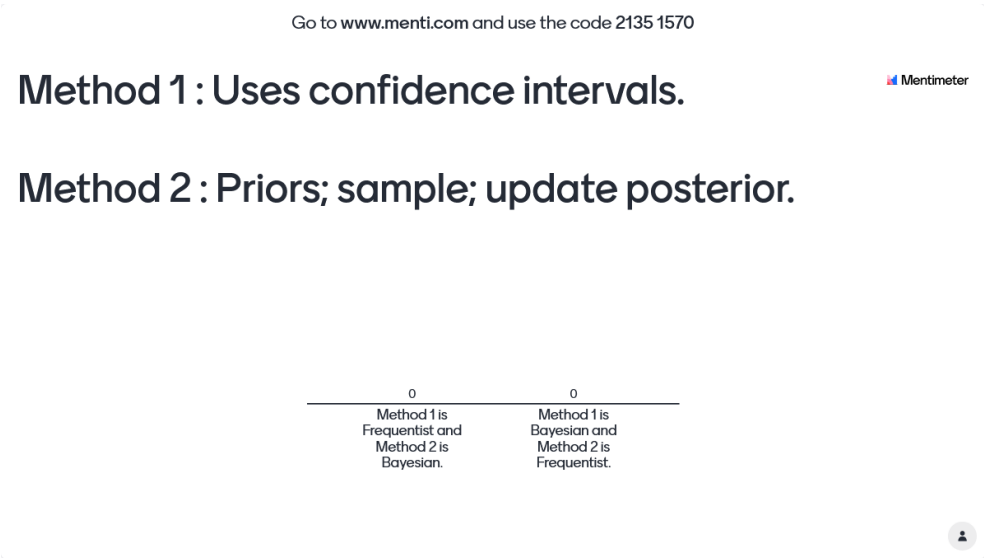

Figure 1: In-class Quiz using Mentimeter

helped them and I continue to use this activity in all my theory-oriented courses.

(iii) **Think-pair-share** – I typically start my lectures with a recap of previous lectures in the course. Here, I invite the students to think-pair-share. I ask the students to recall the core concepts from previous lectures individually for a minute. Then, I ask them to discuss their recollections in pairs for another minute. For the next two minutes, I would invite volunteers to share their recap with the class. This learning activity increases student interaction and also informs me if students have completed their preparatory assignments for the lecture. Furthermore, this learning activity helps students to achieve learning objectives which are at the level of *remember* and *understand* from Bloom's Taxonomy.

(iv) **Short in-class quizzes using digital technology** – I conduct in-class quizzes using digital technology such as mentimeter (). See an example of such a quiz in Figure 1. In this quiz, I ask a question to the students, give them a minute to answer it, and then the results are shown to the class using a word cloud. In my experience, such in-class quizzes enhance student interaction and improve their understanding of the topic. These quizzes using digital technology are especially useful for student interaction in large classes. They also inform me as a lecturer if the class as a whole has understood the topic and accordingly, I can modify my teaching.

(v) **Pre-test to review and refine prerequisite knowledge** – I provide an optional online pre-test before the course for the students to assess their prerequisite skills and knowledge. After completing the test, the students are given model solutions and further reading materials related to each question. Thus, students are able to review and refine the skills and knowledge that helps them throughout the course.

Inclusive and Accessible Education

I have ample experience in devising and implementing various methods for providing inclusive and accessible Education. Toward this objective, I make use of my reflections on my teaching, feedback from other lecturers, official student evaluations, and related scientific literature. Below, I explain some of the methods I use.

(i) **Explicit expectations** – It has been my experience that setting explicit expectations helps the students achieve the learning objectives. I provide students with clear and transparent assessment criteria at the beginning of the course. I also inform them of the relevant deadlines and the resources (such as reading materials, books, computing resources, etc.) that are available to them during the course.

(ii) **Accessible course elements** – Dyslexia, a neurological disability that impairs a person's ability to read and write, affects a considerable number of students worldwide [2]. It has been shown that certain fonts such Arial [3] are more accessible for people with dyslexia. Taking this into consideration, I make use of such fonts in all my teaching materials including lecture slides.

Teaching Experience

I have a broad set of teaching interests and I am able to teach courses that extend beyond my core research focus to a wide class of students. My teaching experience is summarized below in Table 2.

Data Mining (Lecturer)	BSc	140 students	TU Eindhoven	5 ECTS
Reinforcement Learning (Responsible Lecturer)	MSc	35 students	TU Eindhoven	5 ECTS
Embodying Intelligent Behavior in Social Context (Lecturer)	MSc	41 students	TU Eindhoven	5 ECTS
Data Intelligence (Project Supervision)	MSc	50 students	TU Eindhoven	5 ECTS
Statistical Methods for AI (Tutorials)	BSc	-	TU Eindhoven	
Data Mining (TA)	BSc	~ 20 students	IIT Madras	
Introduction to Machine Learning (TA)	BSc	~ 60 students	IIT Madras	
Computational Engineering (TA)	BSc	~ 50 students	IIT Madras	
Introduction to Research (TA)	BSc	~100 students	IIT Madras	

Table 2: Teaching Experience

A short snippet from my introductory lecture in the course of Reinforcement Learning can be found at this link. Video recordings of all the lectures from this course can be found at the following link.

Below I expand on my role in these courses.

(i) **MSc course : Reinforcement Learning** as a responsible lecturer (35 students) – In the course on *Research Topics in Data Mining*, I designed the track of *Reinforcement Learning* independently and developed all the teaching materials including lectures, assignments and additional resources. Furthermore, I planned and conducted all the teaching, supervision and assessment activities.

Learning objectives were that the students would be able to formulate reinforcement learning problems mathematically, devise solution strategies for them and prove performance guarantees for these solutions. This course was designed following the challenge-based learning paradigm and the students were assessed based on their research projects. Under my guidance, all the groups in this track fulfilled the learning objectives and nearly half the groups extended the state-of-the-art as part of their research projects. Under my supervision, one of the group projects has led to a publication [4].

(ii) **MSc course : Embodying Intelligent Behavior in Social Context** as a co-lecturer (41 students) – The learning objective was that the students will be able to use machine learning algorithms as a design tool for creating an interactive and explainable system within educational/health context. In my lectures, I taught about various machine learning algorithms and gave a practicum on their use. This course was mostly attended by students from the Department of Industrial Design. Thus, teaching this course gave me an opportunity to tailor my teaching style as well as content to a wider class of students. Furthermore, I supervised students from this course in their projects to devise interactive and explainable machine learning tools for healthcare or education. Under my supervision, one of the group projects has led to a publication [5]. In this work, we proposed a personalized recommendation device for cardiac rehabilitees.

(iii) **MSc course : Data Intelligence** as a project supervisor (50 students) – The objective of the group project was to design a minimal viable product that is a marketable solution to a realistic problem using a machine learning framework. I supervised 10 groups consisting of 5 students each.

(iv) **BSc course : Data Mining** as a co-lecturer – This was a basic course taken by second-year Computer Science BSc students. In collaboration with other lecturers, my teaching duties involved creating the syllabus, developing all the teaching materials including lectures, assignments and additional resources, teaching, and assessment.

(v) **BSc courses** as a teaching assistant – During my master's education at Indian Institute of Technology Madras, I was a teaching assistant for 4 bachelor's courses, namely – *Data Mining*, *Introduction to Machine Learning*, *Computational Engineering* and *Introduction to Research* (with class sizes varying from 20 to 100). My duties included designing and delivering lectures, meeting the students during office hours and setting up online as well as in-person examinations.

Supervision Experience

I am experienced in supervising students at all levels of university education. I am a co-supervisor for a PhD student and three master's students with thesis topics ranging from deep learning, continual learning, supply chain management and constrained sequential decision making. Under my supervision, PhD and MSc students have published a number of research articles [4, 5, 6, 7, 8, 9, 10]. Moreover, I have been on the assessment committee for bachelor's projects and the thesis committee for master's defenses. Feedback letters about my supervision from a PhD student and an MSc student can be found in Appendix G of my UTQ dossier.

Teaching Evaluations

The official evaluation grade on a five-point scale received for the course of *Reinforcement Learning* was 4.5, which exceeded the university-wide mean substantially. The evaluations for my other courses were positive too and in particular, students evaluated the following aspects of my teaching highly: course design, course materials, ability to teach complex topics in a broadly understandable manner, approachability, and inclusive and accessible learning environment. The complete evaluations can be found in my UTQ dossier. The following bar chart from the evaluation provides further testimony to my teaching skills.

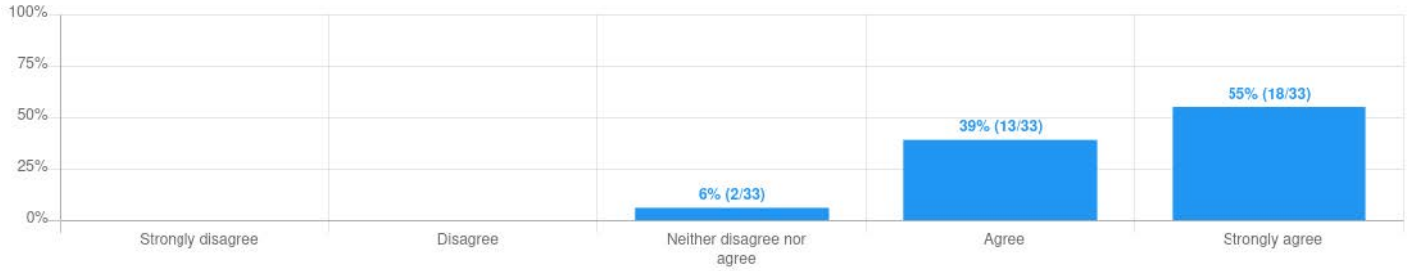

Figure 2: Official course evaluation for 2AMM20 – Percentage of responding students agreeing with – "The lecturer explained the content in a clear and comprehensive way".

I also conducted an anonymous survey amongst students to receive feedback on issues not covered in the official evaluation. The following are the salient results:

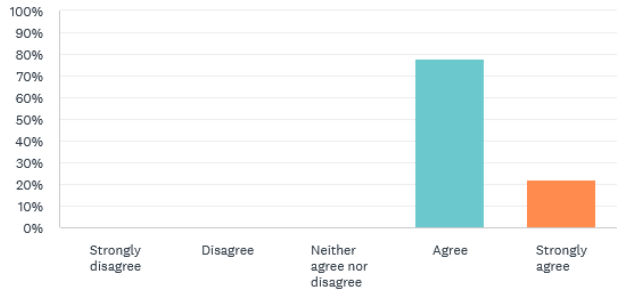

Figure 3: Percentage of responding students agreeing with – "The course materials supported the content well."

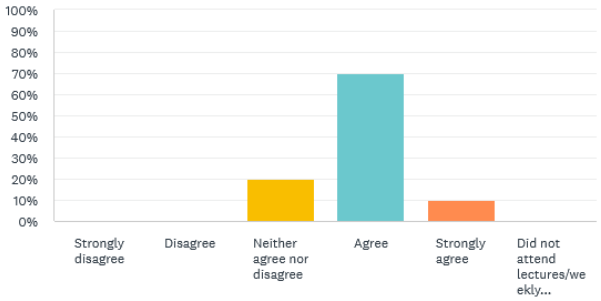

Figure 4: Percentage of responding students agreeing with – "The lecturer fostered an inclusive and accessible learning environment."

The below sample of comments provides further confirmation of students' favorable views of my teaching:

(i) "I think the teacher did an amazing job with the way all the information is organized on the slides (colors, variables, mathematical formulations and equations) and all the real-life examples made the topic interesting. I think the teacher explained the content in a clear and comprehensive way and made it seem easier than it actually is. This course increased my interest in Reinforcement Learning."

(ii) "He did a wonderful job, I looked forward to his classes. They were clear and comprehensible and helped me understand the topic."

(iii) "Reinforcement Learning seems like a very difficult topic for people with a weak background in mathematics, but I felt that you taught us everything step by step and made it easier for us to understand."

(iv) "It is nice that you provide us with direct feedback. This motivates us more to continue."

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