

# Teaching Portfolio

Dong Jo Kim \*

Department of Physics, Jyväskylä University

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## Abstract

My view of pedagogy is described in Sec. 1. In Sec. 2, I present my experiences on teaching and supervision. Finally, I illustrate my contributions to teaching and its competence by summarizing my recent lectures in Sec. 3.

## 1 Pedagogical thinking

As a teacher in the department of physics, I have been thinking that teaching is nurturing students' creativity. Creativity evolves key skills such as critical thinking, problem-solving, imagination, and communication. This is critical because our workplace is changing due to advances in technology in recent years. However, creativity is not something one can measure and cannot be accompanied without mastering basic knowledge at a certain level. How to enrich students' creativity is really challenging in all areas of education. However from my personal experiences up to date, especially in research-orientated lectures, one has to put more effort to create content in a way that students find things in their own interests. The teaching method should depend on the level of the course involved. In advanced courses, I believe that students learn the class materials more effectively with projects rather than examinations. While I find it difficult to implement in elementary courses, it is better to assign extra credit material as a tool to give students opportunities to work on small projects that extend the material beyond homework and exams. While students started to work on small projects, they started to be active in leading the role of learning which contains understanding, problem-solving, and critical thinking through the communications in the group.

I want to emphasize project-oriented teaching which makes students' motivation higher. Usually, the failure of the class results from unmotivated topics and teaching materials. Most of the teachers spend quite a significant amount of time preparing his/her lectures in addition to the knowledge and experiences they achieved over the years but most of the students come to the lecture with limited knowledge as well as limited time. Therefore there is a huge gap between students and teachers. In order to overcome this gap, project-oriented classes are highly recommended. This will help students to achieve something in learning and to get involved easily and extend their studies once the class is over. While I observe exceptionally excellent students tend to enjoy explaining things to others, I found it is also beneficial to those who are leading the role on their own and their knowledge gets deeper. I think good teaching is to make students feel like teachers. If they are well motivated and lead the lecture like a teacher, the class will be very likely a learning ground for teachers as well.

## 2 Teaching and supervision experience

My teaching experience started after my entrance to the university. During my undergraduate student period, I was a tutor for a few high school students as a part-time job for 4 years, the subject was mathematics and English. During the whole period of graduate school, I was teaching assistance for fundamental physics courses and electronic courses in the physics department.

While I was working on my Ph.D. degree, I was very interested in structuring the efficient knowledge transfer from senior students to juniors to keep the laboratory momentum at a higher level. The collaborative work to

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\*dong.jo.kim@jyu.fi

| year         | role                            | topic                                    | institute            |
|--------------|---------------------------------|--|----------------------|
| 1992–2002    | Tutors for high school students | Mathematics, English                     |                      |
| 1997–1999    | Teaching Assistant              | Physics                                  | Yonsei University    |
| 2001–2002    | Teaching Assistant              | Physics                                  | Yonsei University    |
| 2015–2016    | Teaching                        | Experimental Methods in Particle Physics | Jyvaskyla University |
| 2008–current | Teaching                        | Ultra-relativistic Heavy Ion Physics     | Jyvaskyla University |

Table 1: Teaching experiences

establish teaching in a group seemed to be very effective since most people in the research, the area is willing to teach and teaching is one of the most valuable motivations for their work as well.

As a postdoctoral researcher at Jyvaskyla University, later on, I gave several lectures on various subjects in Ultra-relativistic Heavy Ion Physics course. I am spending about 40% of my research time on Ph.D. student teaching in general but in practice, students are interactively developing their knowledge and communication skills through a series of individual meetings and discussions in groups. A brief summary of my teaching experiences is listed in Table 1. Experiences in supervision and student training are tabulated in Table 2 and 3, respectively.

My experiences in communications inside the larger international collaborations are based on speaking to audiences both in large and small groups on a daily basis. The achieved scientific results were very intriguing and successful over years. While I had been paper committee chairs and members for many papers, it had been clear that I gave so many talks and written many reports and papers over my career. These evidently helped me to be a good teacher and also the high-profile collaborators from many different universities and institutes helped me a lot to improve the quality of my scientific work and career. I have been a convener of ALICE flow physics group and actively involved in various paper review committees and had many opportunities on helping young physicists closely. I have been joining many international conferences for delivering talks on behalf of the collaborations. These activities helped me not only to improve the research qualities and profiles of my careers but also to develop my teaching and learning skills over time.

### 3 Contribution to teaching and Teaching competence

In recent years, I have been changing the main goal of the lectures, from educating students with basic knowledge of specific research to letting students find basic concepts and public relations of the research through discussions. Students find their own needs to address the physics concepts and make them applicable. Also, I tend to give more discussion time to students. That is why I implemented poster sessions instead of exercise sessions. The poster presentation session every week is meant to help students to build and demonstrate their understanding. This would give students opportunities to practice skills and consolidate learning. Finally, I hope that this would help students to feel a sense of accomplishment every week. A poster is formed in their own way to discuss what they have learned, what to be learned more and what are the most interesting and/or important things. Interestingly every poster shows a clear difference in styles and contents even though the same subjects were discussed. The discussions have been very fruitful in the sense that they have been observing different styles of presenting or explaining the same subject.

In general, the basic concepts and materials for lectures are prepared as slides. I often used a mind-map tool to give students better pictures of understanding and guided them to draw their own mind-map throughout the course. I also invite one or two Ph.D. students from previous years to give a brief overview of their experiences in the subjects of the classes. Students prepare a few slides and discuss things with other students for about 15 minutes. The communications among the students in the class and the interactions with the senior students might help them to develop their social life in school and their careers. The final poster made on my office wall in 2019 in two groups is shown in Figure 1. One of example of the posters in the other lecture is also shown on the right in Figure 1. Personally, I selected it as best because most of the conceptual physics discussed during the lectures was shown in a clear way and important details were quite nicely summarized so that I see how much she understood the overall picture and relevant physics.

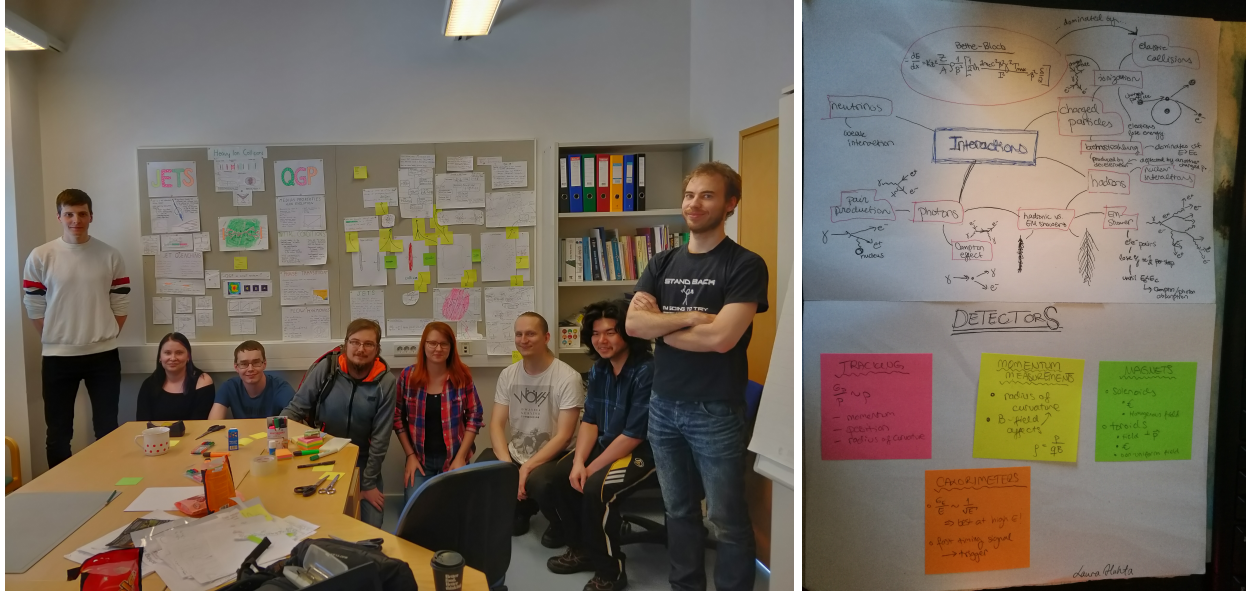


Figure 1: Posters made on my office wall during the final lecture in 2019(left) and a poster by Laura Huata in the other course in 2018(right).

| year         | name              | role           | institute            |
|--------------|-------------------|----------------|----------------------|
| 2014-2015    | Tomas Snellman    | MSc supervisor | Jyvaskyla University |
| 2015-2016    | Elias Barba Moral | MSc supervisor | Jyvaskyla University |
| 2016-2017    | Jasper Parkkila   | MSc supervisor | Jyvaskyla University |
| 2017-2018    | Oskari Saarimaki  | MSc supervisor | Jyvaskyla University |
| 2016-2019    | Tomas Snellman    | PhD supervisor | Jyvaskyla University |
| 2017-current | Jasper Parkkila   | PhD supervisor | Jyvaskyla University |
| 2018-current | Oskari Saarimaki  | PhD supervisor | Jyvaskyla University |
| 2020-current | Anna Onnerstad    | PhD supervisor | Jyvaskyla University |
| 2021-current | Heidi Ryttonen    | PhD supervisor | Jyvaskyla University |

Table 2: Experiences in supervision

| year | name                  | role                        | institute            |
|------|-----------------------|-----------------------------|----------------------|
| 2009 | Mikko Kervinenn       | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2011 | Esko Pohjoisaho       | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2014 | Tomas Snellman        | CERN Summer Internship      | CERN, Switzerland    |
| 2015 | Elias Barba Moral     | Jyvaskyla Summer Internship | Jyvaskyla University |
| 2016 | Jasper Parkkila       | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2017 | Oskari Saarimaki      | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2017 | Nimmitha Karunarathna | CERN Summer Internship      | CERN, Switzerland    |
| 2017 | Teemu Kovanen         | Jyvaskyla Summer Internship | Jyvaskyla University |
| 2018 | Elin Nyman            | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2019 | Jani Penttala         | CERN/HIP Summer Internship  | CERN, Switzerland    |
| 2020 | Kevin Gilbert         | Jyvaskyla Summer Internship | Jyvaskyla University |

Table 3: Experiences in student training