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# Project-Based Education Research Course Supports Exchange-students' Research Minded Teacher Identity

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## **Abstract**

Project-based education (PBE) gives possibilities for students to work together and feeling of belonging in a community even during distance learning. At the Department of Chemistry, University of Jyväskylä (JYU), a group of exchange students participated in a PBE chemistry teacher education research course online. The goal of the course was to enforce the connection between research on science teaching and acting sustainable in society. This study is based on semi-structured online group interview of the students after this PBE course. The main focus of this investigation was how positive feelings and attitude affect learning.

## **Key words**

Project-Based Education; professional development; sustainable development goals; positive attitude effects

## **INTRODUCTION**

During academic year 2020-2021 only few students could travel to other countries since the Covid-19 pandemic made normal, on-site student exchange impossible. Almost all teaching in Higher Education globally were transferred online. Simultaneously, virtual exchange possibilities became real. Exchange opportunities abroad is still much more than just studies. It is about experiencing the foreign country and student life. "New Covid normal" was something different. Students were looking for different kind of support to handle their loneliness and other emerging personal problems besides being challenged with new forms of education. Planning studies and organizing teaching to support students' engagement and motivation become more important than ever before. Moreover, teaching students needed new ways and perspectives also from teachers in the void of other educational-related social connections.

Student-activation strategies such as inquiry-based (science) education (IBSE) or project-based education (PBE) give more possibilities for students to work together and the feeling to be part of a community. Also, there is a significant body of research continuously proving their effectiveness (see, for example, Furtak et al., 2012; Rusek, 2021). Here, a case study to address students' views of a virtual research-focused course on sustainability is presented. The focus is on students' feelings and

experiences after completing the online course as part of their exchange period. Our focus is to show how pedagogically engaging and meaningful online studies could help students to develop professionally, as well as to support the students to handle social loneliness.

## THEORETICAL BACKGROUND

Emotions have been established as a significant factor affecting learning and attitudes for learning. Especially, emotions are both experienced in the school setting and instrumental for academic achievement and personal growth (Pekrun et al., 2018). Some studies have been made on how emotions affect learning at workplace. For example, Hökkä et al. (2019) have indicated that emotional dimensions have been mostly neglected in work-related research but also in research concerning education at Higher Education institutes. In addition, they have discussed how emotions have been described in recent publications highlighting especially the role of feelings in decision-making, attitude to studying for working life, and development of professional identity. At same time, agency and professional development have been in focus in Higher Education research (Vähäsantanen et al., 2019) giving two different perspectives on the research presented here: Firstly, how students feel when they study and make practical work on this example course, and secondly how the teacher of the course work in organizing and teaching the learning experience and its path during the course. Both sides are work-related but with different subjects of focus. However, in research it is challenging to separate work and practical work-related learning. As Arvaja (2018) have showed, tension between these two aspects as well as the tension between Higher Education institution leaders and teaching staff can be seen as a lack of interest of developing research-based and student-oriented teaching.

Emotions affect learning and professional growth. According to Hökkä et al. (2019) both negative and positive emotions are meaningful for learners. In general, more negative notions to learning are seen based on studies published. As Vähäsantanen et al. (2021) indicate, development of agency can be seen as active participation, for example, to take actions to develop students' work. Agency is also seen as a driving force to teachers to assess their own learning besides teaching. Moreover, agency can be seen as development of professional identity. Tews et al. (2017) have found that "fun supports learning" when they were looking at informal learning. In addition, they have emphasised that all "fun" is not equal and that should be remembered and accounted for when teaching or workplace are developed.

What students learn during their exchange study periods have been studied and described in more detailed in the last few years. Especially, Roy et al. (2019) have listed skills that students learn during short term study exchange periods. There are three areas highlighted: Cultural (outcomes, awareness/

global mindedness, intelligence, sensitivity and empathy, adaptability, intercultural competence), personal (awareness of moral and ethical issues, academic performance, self-efficacy, confidence) and career outcomes (professional development, career prospects, networking, soft skills, interest of career develop). In addition, there are also findings in research that learning appears in a spiral fashion and needs to be repeated several times in order to deepen the knowledge (Aarto-Pesonen et al., 2017). This gives especially a mindset for virtual educational efforts for which teaching and learning methods adopted should be repeatedly used and exploited. This is important in teacher education where the experiences and educational models used become familiar enough to the students to be exploited later in their teaching profession.

### Research Questions

- How to use Project-based education (PBE) to support Student teachers' research attitude development?
- How do emotions effect student's professional development and learning?

### RESEARCH COURSE ON PBE FOR STUDENT TEACHERS

University of Jyväskylä (JYU) organized a research course (5 ECTS) for student teachers during their study exchange period in Jyväskylä. They were studying in Jyväskylä only one term and during extreme Covid-19 pandemic times teaching was organized fully online. These exchange students were credit-base mobility students, and the students are expected to accumulate credit points from the University visited. According to the Erasmus Charter, all these credits should be recognised by the student's home university (European Commission, 2021). Some of the students were not able to arrive in Finland and they studied remotely from their own country. The research course was organized for the first time fully online, and it focused on Project-based education in the context of UN Sustainable Development Goals (UN, 2015).

Course started at the beginning of February and there were online meetings once a week, on Friday afternoons. At the beginning of the course students got open-ended description of the course outcomes and working methods. They were asked to trust in the process in order to mimic a research project and act accordingly. This was based on the pedagogical target to engage the students in the studies, to enhance their research-skills, and to increase their own agency and responsibility in the project outcomes and their own learning process. Shortly, the course was conducted in a way where the students changed their role from participating learners in the beginning to co-operational researchers in the end. The final product of the research project – and the outcome of the course - was a common pedagogical model that was co-created and collaborative owned (Aksela, 2019). The actual

realisation of the course itself is presented elsewhere (Lundell et al., unpublished), and here we focus only on the outcomes from the interview with the students after the course.

### Data Collection

After the PBE Sustainable course the students were asked to participate in an online interview. They were explained that they could decide themselves if they want to participate and that results will be used for research, and that results will also be published. Students could trust on that information of the results will be handled confidentially, and they will not be recognised from the study. All students who participated the course and managed to pass it, were willing to participate in the online interview.

Data were collected using semi-structured interview performed via Zoom. All students were asked to join in video conference by Zoom for the group interview. The interview was recorded, and afterwards automatic texting was used to provide a preliminary transcript of the interview. The researcher interviewing the students was not familiar nor interacting with the students during the course the students had taken. Because students were not using headsets at the interview, texting had a lot of errors, with some parts needed to be corrected manually. This was made by an additional researcher not familiar with the course nor the students. Language of the interview was English.

The interview transcripts were analysed thematically by one author and transcripts were also read by the other authors of this study. In addition, facial impressions could be seen, and these were accounted for by adding explanations of them in the transcripts. Cultural differences were also discussed in the interview. However, it was impossible to minimise cultural effects on the results.

## RESULTS

One out of three students could include credits of the course into current study degree at their home institution. Because of the Pandemic, only two out of three of the students could arrive to Finland but had to study remotely, because JYU was closed. The third student had to participate in the course from the student's home. Students were both in Master and Bachelor level, EQF level 6 and 7. European Ministers three levels education cycles, agreed on 2005 at Bergen during Bologna process, means same as 1<sup>st</sup> and 2<sup>nd</sup> cycle students. (Europass, 2021). The course that the students participated at was a master level teacher education specialisation course on research methods especially designed for exchange students. The course was delivered in English, since all students participating were exchange students from abroad. Two out of three of course students had studied in English before. Two out of three students had also done educational research during their studies at their home university earlier.

Students described the teacher of the course during the interview. They did not use the word “teacher”. From the recording we can find that students had a pause before they found the word they wanted to use. It seemed they did not think “teacher” was the word they want to use. None of them had English as their mother tongue and finding a proper word to describe the relationship between the teacher of the course and students made them feel uncomfortable. They used many words to describe teacher, for instance, instructor, he, professor, supervisor, or they used the first name of the teacher or the full name of the teacher. Instructor was the most used word to describe the leader or teacher of the course. The most interesting finding was that they would not like to use word teacher, even that was the way it was described everywhere (Study system in JYU, information given to students etc). This could reflect the situation where the teacher was actually more a peer within the group as could be expected when a research group is collaborating and co-creating (Aksela, 2019)

When students were asked to describe their learning outcomes, they expressed views on research skills and writing report skills. When they were asked what they could add to their CV or application letter from this course if they were applying positions, they could not describe specific skills or competences. One of the students mentioned being acquainted with Finnish education system and experiencing it first-hand. The student thought it would be beneficial to mention studying in Finland when applying positions because that could strengthen their application for a teacher position in their home country. They could not describe other skills or competencies they had learned. This is quite a normal finding. If students were not oriented to skills and competencies, they are not able to describe them as outlined in the Erasmus Skills project (2020). From our transcript we can see that students mentioned many skills that has also described on short term exchange (Roy et al., 2019). They understood multicultural group skills, language skills, reporting skills and many cultural aspects, and described personal skills. This finding is in line with Roy et al. (2019). This course did not put focus on teaching skills or highlighted skills that could be learned besides research skills involved in science education to understand where learning takes place and how it can be made visible.

Many ways to describe emotions is observed from the interview transcript. Students describe their feelings in several ways, but always expressing them in a positive way. When asked why everything they say is positive, they started to think it more carefully. Different evaluation manners in different Higher Education institutions were highlighted, and it is one of the most remarkable findings in our study. Here is how the student described the difference:

*“We have only like the zero-one, something is wrong, or something is right. Can you imagine, I didn't do like the teacher wanted me to do, but it was okay!”(S1).*

The interview of the students was organized as a group interview. There were exchange students and virtual exchange students in the group interviewed. From the data we are not able to separate results whether the students were located on-site or whether they were distant, virtual students. There are several reasons for this: The group was small, and students heard each other's answers. The interview was conducted in a dialogic manner. In the future, it would be interesting to investigate if professional development and skills learned during exchange could be different for virtual exchange students compared to traditional exchange students. Moreover, in the post-pandemic era also hybrid teaching opportunities have merged, which could be employed to modify the possibilities to include local, exchange and virtual exchange students simultaneously on a lesson. In the long run being able to discuss your own research, validate it, employ it in another context and experience it first-hand are professional development skills that will affect the upcoming teaching career of any teacher student.

Students described their positive approach to this PBE-course by comparing it to their other courses both during the exchange period as well as their home institutions. They mentioned that normally they do not like study on Fridays and especially on Friday afternoons. They rather want to spend time with their friends. The PBE-course was organized on Friday afternoons, and still students anticipated to attend these course online sessions. By the transcript it is hard to find reason for this. Normal life was different during the Pandemic and spending time with friends was restricted for all students. However, this does not explain the positive attitudes the students had for studying educational research methods in the context of sustainability on Friday afternoons.

In the interview transcript it is seen that students indicate they always opened cameras for the teaching sessions. However, they did not do that in other study situations. They explained that in this course teacher always opened his camera as was done also in other courses. When asked why they choose to open camera, the students started to express reasons why they do not like to open camera. They found many reasons for this and at same time they could not find a particular reason why they wanted to open camera in this course. In addition, one of the students described that only once the student's computer was broken, and the student had to participate via mobile phone. Expressing this the student appeared sad that it was not possible to open camera like everyone else were doing. This clearly state a feeling of belonging and mutual respect between the course participants, as well as deep engagement for the course and studying in this context. The engagement can be witnessed by changing their behavior during a learning situation. (Fredericks et al., 2004)

## DISCUSSION

This research, in line with some others (e.g. Dolenc et al., 2022), showed that the PBE-course supported student's agency and self-efficacy. The project focused upon during the course was planned to be open ended in a sense of a real research project, and students felt they had a lot of decision-making power on their own project. This enabled the growth of students' professional development, confidence in their own making, and their self-efficacy. In addition, we could also observe that by getting power on decision-making students felt satisfaction in their own doing and achieved outcomes. They were feeling positive and optimistic for learning and participating in the project, even Pandemic situation could have given them many reasons for negative feelings. On the other hand, they felt they learned, and in addition their self-competent level rose. It is seen that their professional skills and competencies as well as agency developed without them actually realising it themselves before this interview.

Positive atmosphere of the course obviously came from the group incorporating both the teacher and the students. All the students liked to work together, and they liked to learn the way course was organized. Will this work with another group is impossible to predict, but similar open-ended courses have been conducted after this research was performed, and all the courses seem to point to a similar direction. Based on the interview we are not able to describe what makes the course so successful. One important point was teacher's attitude and working methods as highlighted by the students. This made the students feel that they are supported, cared for, and their skills appreciated. This also hides an authoritative teacher role and makes the teacher more a person who support learning and foster students' development. Based on the comments and attitudes expressed by the students during the interview, the students obviously felt this course teacher role different from the courses they had encountered previously. It would be interesting to make more research on this topic, but it means we should be able to follow also the teaching sessions or lectures besides conducting after-course interviews. This, however, could bring out data evidencing the actual activating components of teaching reaching for enhancing students' engagement and increased self-efficacy – and leading to meaningful and interesting learning experiencing supported by positive feelings.

It would be interesting to interview the teacher for more detailed insights on how teachers are prepared and supported for activating teaching methods. Moreover, how common it is to organize courses this way in JYU, as this example course was organized? What kind of support is offered to teachers in JYU and how such real-life approaches are cherished and nurtured? Usually, in academic context teaching is not valued as high as research activities. This makes also teaching development less valuable compared to research. The tension between research and teaching can be seen on lack of interest toward teaching. How did this course teacher get support and how this tension is seen or felt



in JYU – or have we just stumbled upon a rare example of activating teaching methods in action? In addition, the teachers own feelings would be interested to hear and learn from. Did the teacher feel as positive in this course as the students did? How did the teacher feel working at the course as “instructor”? Did teacher understand and see teacher’s role same way as the students did? Was the teacher feeling motivated and professionally compatible? In future research on these topics would be interesting to make in order to triangulate the success of activating teaching and learning methods from the student and teacher perspectives. Our data from the student interviews point out a rare example of teacher jumping in the deep end of the pool with the students, and truly engage into a research project with unknown destination. The data shows very positive feedback of this challenging but rewarding approach by the students.

The way this PBE-course was organized to enable students’ research skills and competencies development. The important skill for student teachers was the confidence to use research in their future work. Teachers can develop their work by with a research-based attitude. Studying teacher’s own work (curricula, teaching material, students’ learning and evaluating study outcomes) is the key to develop schools and teaching. The attitude towards research during academic studies is irreplaceable. Employing project-based education and right teacher attitude it seems to be possible to manage and support meaningful learning (Shuell, 1990).

Positive feelings and fun seem to make working easier, as mentioned by Tews (2017). In our research similar results are seen. Can we still say that positive feelings made learning easier or did learning create positive feelings? This is impossible to find out based on the data here. But does it matter which comes first? More important is to find out that positive feelings create positive outcomes. During hard pandemic time this PBE-course managed to create some positive outcomes. Exchange students described their self-efficacy growing, they felt themselves confident and their agency developed. They could describe many skills and competencies they learned. PBE-research course managed to fulfil their needs and gave them an idea how to do teacher work employing research to scrutinise learning and teaching. The students were motivated to learn, and they found their interest towards research. It was interesting to find out that as Aarto-Pesonen (2017) describe spiral of professional development, attitude can also change on repeating learning. This was seen among students who described they have done research studies before. On this course they still could learn new skills, found new positive attitudes and developed their professional skills as well as their attitude.

## CONCLUSION

PBE proved a useful method for the research course. By this method, it is possible to motivate students to learn and to support their professional development. As seen in the virtual course and in the international context, PBE can offer possibilities to make learning fun and positive. It can also minimize hierarchy between students and teachers. International students could work together and adapt to multicultural group during the collaborative and co-creative PBE-course. Positive atmosphere helped students' self-efficacy development and initiated a creative atmosphere at same time they learned to make research during their exchange in foreign country. Besides skills and competences acquired, they expressed a positive and grateful attitude for the experience and the opportunity to attend the PBE-course.

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