



Influence of diversity in lectures on the students' learning process and on their perspectives about renewable energies in an international context - The students' view



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ABSTRACT

This paper focuses on student diversity as an enabling factor in renewable energy education and qualitatively examines its effects on the learning process and experience, both during the educational period as well as in career and personal growth. It draws on the experiences of students and alumni of the Postgraduate Programme Renewable Energy (PPRE) at the Carl von Ossietzky University, Oldenburg, Germany. The programme, which has been instrumental in renewable energy education to a diverse student population since its beginnings in 1987, has recently (in 2016) won the Ars Legendi prize for its approach to diversity in learning. The paper discusses various differences in individual, academic and cultural backgrounds, to assess their contributions to the learning process and to the personal and professional development, based on the study participants' opinions.

1. Introduction

The Postgraduate Programme Renewable Energy (PPRE) began in 1987 as one of the first initiatives for promoting education specifically in renewable energy (University of Oldenburg, 2017a). Through the years the programme has improved and found new methodologies to provide up-to-date information in the field. Therefore, the University of Oldenburg works in cooperation with institutions such as: the Centre for Wind Energy Research (ForWind), the Institute for Information Technology (OFFIS), the EWE Research Centre for Energy Technology (NEXT ENERGY) and the School of Computing Science, Business Administration, Economics, and Law. Each one of them have a wide expertise, providing diverse information to the students about the latest findings in each renewable energy field (University of Oldenburg, 2017b).

PPRE is currently structured as an 18 month programme with lectures concerning the different renewable energy technologies (wind energy, solar energy, biomass, etc.) and the political, economic and social side of renewable energies. Complementarily, the programme includes hands-on experience on the technical knowledge with different laboratory courses, a 2 months internship and a 6 months master thesis.

The students are given the flexibility to decide which renewable energy field and country they would prefer to do their practical training, not being limited to Germany only (University of Oldenburg, 2017c).

Based on communications with the PPRE programme coordinator, over 400 students from 79 countries have been trained and the programme is designed to encourage inclusion in education, making its courses available to students from both universities in Oldenburg: The Jade University and the University of Oldenburg (University of Oldenburg, PPRE statistics (2005–2017)). The authors of this paper, for example, are current and former students from three different continents, speak three different mother tongues and have four different study focuses that were involved in the PPRE lectures and have lived its diverse environment themselves.

This paper focuses on discussing the following question: Is student diversity, based on the student's perspective, an enabling factor in renewable energy education and is it an influencing aspect in the students' future career?

A vast majority of the literature covering the influence and impacts of diversity on student experience in higher education, focuses on race, ethnicity and minority groups (religious and otherwise) from the perspective of equal opportunity (Gupta, 2006; Gurin et al., 2002; Herring,

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2009). This paper however, chooses to focus on other forms of student diversity such as geographical origin, level of development of their country, sector of work experience, gender and academic background (both technical and non-technical). Also, diversity is seen as a necessary factor for the enrichment of the higher education process rather than as the outcome of fair representation and equal opportunities. The investigations in this paper on the impacts of diversity in these fields on the student learning experience and career growth aim both to qualitatively gauge the impacts of a programme that prioritises diversity and share the experiences of those who participated in it.

2. Methodology

A questionnaire on various aspects of diversity was circulated among potential respondents through the PPRE programme's alumni network email group together with a request to respond. The request was expected to reach the alumni network, composed of alumni of the PPRE as well as other allied programmes at the University of Oldenburg. Of the 560 members thus contacted, 19 PPRE alumni and 14 non-PPRE alumni voluntarily responded. The data collected is therefore likely to include a self-selection bias with respondents representing a relatively small sample of the people contacted. In addition to this, questionnaires were also distributed among the current (2015–17) batch of 16 students, whose responses were noted separately after a group discussion session ([Current and former students participating in PPRE lectures 2016](#)).

The questionnaire was designed to investigate the impact of diversity on the course and on the respondents' learning experiences. The respondents' opinions on their personal and professional growth in a diverse environment were collected and form the basis of this study. Additionally, regularly maintained records of the PPRE course were accessed in order to quantitatively analyse other diversity-relevant factors such as nationality, gender, previous field of study, sector of employment before and after attending the course and number of applicants (University of Oldenburg n.d.). This data was subject to analysis, both in order to estimate the various types of diversity present within the sample population considered, as well as to identify and quantify long-term data trends.

3. Results and discussion

The question stated in the introduction will be discussed under four major aspects: students' background, academic structure of the PPRE programme, gender equality and the influence of diversity on students' skills.

3.1. Influence of diversity in the students' origins and professional backgrounds in their perspective of renewable energies in an international context

The process of internationalisation of higher education that has occurred in Europe over the last four decades has been a result of the active removal of barriers to the mobility of teachers, students and researchers. The intent of this drive towards greater internationalisation is to increase comparability across higher education systems, enhancing the employability of European citizens, improving the competitiveness of European education as a whole and promoting European cooperation in quality assurance in academia ([Vermeulen, 2011](#)).

Within the PPRE programme, the results of the survey among alumni and current students reveal the considerable impact of regional diversity of the students in the programme on the learning experience of renewable energies and harnessing of locally available resources. The presence of students from differing climatic and geographical areas contributes to a better understanding of the variety of resources available and the multiple ways in which they can be used. This is illustrated by a quote from one of the participants: "One of the courses we took was

for us to calculate how much solar radiation we can get in our towns where we come from in our different countries, the results were diverse and very interesting. And once we formed consulting groups [to] try to come out with different renewable energy projects using the resources from our home countries, the results were excellent."

In addition, there is a definite educational value brought to the classroom by student diversity. The active presence of students from different sectors, many of whom have field and project management experience, enables others to benefit from their knowledge and exposure. While describing the country reports course, as part of which students are required to investigate and present the renewable energy and policy status, in either their home country or a zone of interest, one of the participants wrote: "The country reports were [...] a way to present the situation in our home countries, thereby helping our fellow students to gain some insight of the energy situation in other parts of the world."

The diversity in the group has also created a large network of professionals around the world, who regularly consult each other when region specific information is required, as is often the case with engineering, procurement and construction in a global market, or region specific energy standards and policy guidelines. The network enables rapid contact with an expert in the field, whose credentials are verified and with whom there is a shared sense of community and collegial spirit, in spite of the relative anonymity of the two parties, as described by a participant: "Since I've graduated from the PPRE University and moved out of Germany to work in international development, my current organization often uses the network of the PPRE graduates located all over the world to find specialists with specific in-country experience."

Another field where diversity among students was found to have an impact was the interaction between students from developing and developed countries. This is considered particularly relevant given the importance of renewable energy systems for application in sustainable development and the significant proportion of students who pursue careers in the development sector. These interactions play a major role both in terms of the comparison of energy and resource demand and use as well as by bringing together different attitudes to learning and education. As one participant put it: "Students from developing countries have experienced that their teachers are accessible, and it is ok to ask questions [while] students from developed countries seem to learn to be more flexible regarding time, rules, working style, and cultural expectations."

3.2. Diversity in the academic structure of the Postgraduate Programme Renewable Energy (PPRE) and its influence on students career path choices

After finishing the PPRE programme, the students follow different career paths. According to the records of the PPRE course, from 2006 to 2015, 100 out of 191 alumni were working in the industry; 48 alumni decided to be involved in research and education, 30 of whom continued with PhD studies; 37 work in the public sector or in NGOs and development organizations and 6 remained unemployed. 96% of the total number of the students in the mentioned period are engaged in the renewable energies sector ([University of Oldenburg, PPRE statistics \(2005–2017\)](#)).

These different career paths require considerable knowledge of global energy affairs, distribution of resources and policy regulations as well as intercultural communication skills. The fact that the students have a broad spectrum of career-enhancing options proves that the PPRE course is diverse in its structure as well as its content. The international and academic exposure in renewable energy fields, in addition to an effective use of the potential for collective learning, may have played a role as it has been noted frequently by the participants, for example: "The skills I learnt by being exposed to an international and diverse environment enabled me to apply to jobs at international organizations..."

As mentioned in the introduction, the knowledge shared with the students on renewable energy technologies is built by institutions

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