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## **Intercultural and Interdisciplinary Exchange between German and Southern Africa's Students within PEESA II**

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### **ABSTRACT**

*The PEESA II project promotes the exchange between German and Southern Africa's students in order to increase the number of highly qualified experts in the field of renewable energies and the quality of curricula developed in the previous PEESA project. However, the students are from different cultures and with different educational backgrounds. The guiding research question is as follows: How to organize the exchange between German and Southern Africa's students who are from different cultures and with different educational backgrounds? The **purpose of the work** is to work out the organizational model of intercultural and interdisciplinary students' exchange underpinning analysis of the students' evaluation of their participation in an intercultural and interdisciplinary team. The **research methodology** comprises the study of the meaning of the key concepts of "culture", "intercultural" and "interdisciplinary". Moreover, the analysis*

*demonstrates how the key concepts are related to the idea of renewable energies. Explorative study was carried out during the PEESA II Summer School in Vanderbijlpark, South Africa, in 2017. The empirical findings indicate that the students evaluation of their participation in an intercultural and interdisciplinary team is positive. Directions of further research are proposed. The novel contribution of the paper is the newly formulated hypothesis.*

**Keywords:** Culture, Intercultural, Interdisciplinary, Students' Teams.

## INTRODUCTION

Many researchers acknowledge that, high-priority issues of today, such as renewable energy, require innovative solutions. The means of development of such innovative solutions include

- on the one hand, cultural synergy and diversity, and
- on the other hand, collaboration of scholars from various fields (Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy, 2005).

The PEESA II project promotes intercultural and interdisciplinary exchange between German and Southern Africa's students in order to increase the number of highly qualified experts in the field of renewable energies and the quality of curricula developed in the previous PEESA project. Therefore, the students from different cultures and with different educational backgrounds are required.

The guiding research question is as follows: How to organize the exchange between German and Southern Africa's students who are from different cultures and with different educational backgrounds?

The **purpose of the work** is to work out the organizational model of intercultural and interdisciplinary students' exchange underpinning analysis of the students' evaluation of their participation in an intercultural and interdisciplinary team.

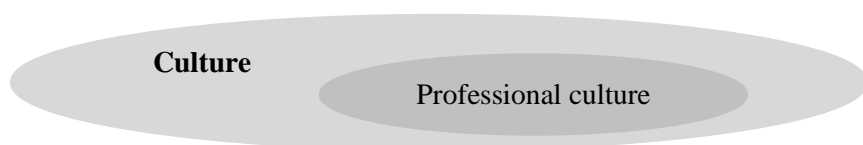
The **research methodology** comprises the study of the meaning of the key concepts of "culture", "intercultural" and "interdisciplinary". Moreover, the analysis demonstrates how the key concepts are related to the idea of renewable energies. Explorative study was carried out during the PEESA II Summer School in Vanderbijlpark, South Africa, in 2017.

## CONCEPTUAL FRAMEWORK

A framework means the specific viewpoint (Ahrens & Zaščerinska, 2014a) on a phenomenon. A conceptual framework means the unity of concepts that are used for a particular study (Ahrens & Zaščerinska, 2014a). The present conceptual framework unites the concepts of

- "culture",
- "intercultural" and
- "interdisciplinary".

Taylor said that culture is "that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society" (Seymour-Smith, 1986). It should be noted that the overall term "culture" includes such an element as professional culture as demonstrated in Figure 1.



**Figure 1: The relationship between culture and professional culture.**

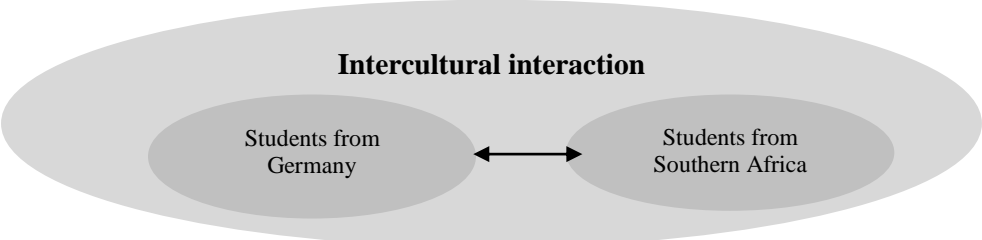
The definition of the term “intercultural” implies cultural differences between distinct cultural groups (Truong, 2014) including various professional groups as revealed in Figure 2.



**Figure 3: The relationship between various professional groups.**

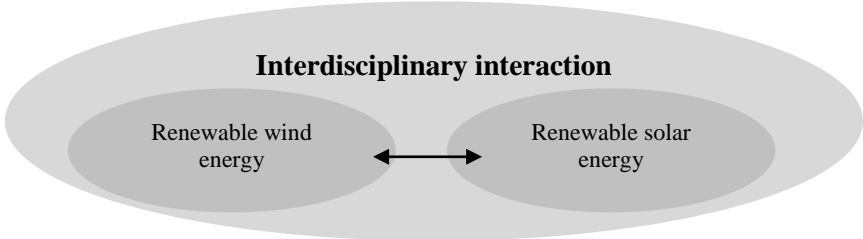
Students who belong to different professional groups represent different cultures. In the present research, only the students’ cultural differences and not their professional differences are taken into account while developing the organizational model of German and Southern Africa’s students’ exchange.

Further on, intercultural means interaction between distinct cultural groups (Truong, 2014) as shown in Figure 3.



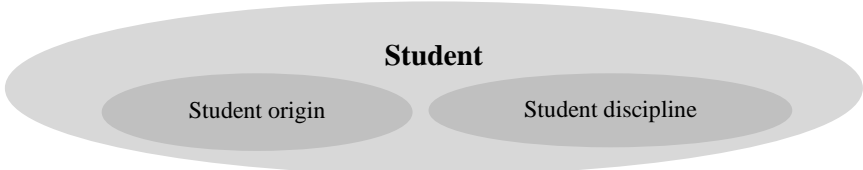
**Figure 3: Intercultural interaction between distinct cultural groups.**

Collaboration of scholars from various fields is identified as interdisciplinary (Ahrens & Zaščerinska, 2014b) as illustrated in Figure 4.



**Figure 4: Interdisciplinary interaction between scholars from various fields.**

Hence, the development of the organizational model of German and Southern Africa’s students’ exchange is based on the interaction between the students who obtain the culture of different countries (or different origins) and different disciplines as disclosed in Figure 5.



**Figure 5: Individual level of students’ exchange.**

## EMPIRICAL STUDY

The present part of the contribution demonstrates the design of the empirical study, results of the empirical study and findings of the study.

### Design of the Empirical Study

The design of the empirical study comprises the purpose and question, sample and methodology of the present empirical study.

The guiding research question is as follows: What is the students' evaluation of their participation in an intercultural and interdisciplinary team? The purpose of the empirical study is to analyze the students' evaluation of their participation in an intercultural and interdisciplinary team.

The empirical study was carried out during PEESA II Summer School at Vaal University of Technology in Vanderbijlpark, South Africa in the period between 27th February 2017 and 3rd March 2017. It should be noted that PEESA II is the project „Hochschulkooperation „Energy Efficiency in Southern Africa“ supported by Bundesministerium für Bildung und Forschung, Germany. The PEESA II project is being implemented between December 1, 2016 and December 31, 2018. PEESA II Summer School at Vaal University of Technology in Vanderbijlpark, South Africa was the first part of the student exchange.

Explorative research has been used in the empirical study (Mayring, 2007, p. 6). Explorative research is aimed at developing hypotheses, which can be tested for generality in following empirical studies (Mayring, 2007, p. 6). The explorative methodology proceeds

- from exploration in Phase 1
- through analysis in Phase 2
- to hypothesis development in Phase 3.

Phase 1 *Exploration* is aimed at data collection. Phase 2 *Analysis* focuses on data processing, analysis and data interpretation. Phase 3 *Hypothesis Development* ensures analysis of results of the empirical study and elaboration of conclusions and hypotheses for further research.

The interpretive paradigm was used in the empirical study. The interpretive paradigm aims to understand other cultures, from the inside through the use of ethnographic methods such as informal interviewing and participant observation, etc (Taylor & Medina, 2013). Interpretive research paradigm that corresponds to the nature of humanistic pedagogy (Luka, 2008) was used in the present empirical study. The interpretive paradigm creates an environment for the development of any individual and helps them to develop their potential (Luka, 2008). The core of this paradigm is human experience, people's mutual everyday interaction that tends to understand the subjectivity of human experience (Luka, 2008). The paradigm is aimed at understanding people's activity, how a certain activity is exposed in a certain environment, time, conditions, i.e., how it is exposed in a certain socio-cultural context (Luka, 2008). Thus, the interpretive paradigm is oriented towards one's conscious activity, and it is future-oriented (Luka, 2008). Interpretive paradigm is characterized by the researcher's practical interest in the research question (Cohen, Manion & Morrison, 2003). Researcher is the interpreter.

The sample of the present empirical study was composed of 16 students who took part in PEESA II Summer School at Vaal University of Technology, Vanderbijlpark, South Africa:

- Four mechanical engineering students from Hochschule Wismar, University of Applied Sciences, Technology, Business and Design (HSW), Wismar, Germany,
- Four students from Flensburg University of Applied Sciences (FUAS), Flensburg, Germany,
- Two energy engineering students from Cape Peninsula University of Technology (CPUT), Cape Town, South Africa,
- Two solar energy students from Namibia University of Science and Technology (NUST), Windhoek, Namibia,
- Two electrical engineering students from Tshwane University of Technology (TUT), Pretoria, South Africa, and

- Two solar energy students from Vaal University of Technology (VUT), Vandebijlpark, South Africa.

In order to save the information of the present research confidential, the respondents' names and surnames were coded as follows:

- Four mechanical engineering students from Hochschule Wismar, University of Applied Sciences, Technology, Business and Design (HSW), Wismar, Germany were coded as R1, R2, R3 and R4 (Respondent 1, 2, 3 and 4),
- Four students from Hochschule Flensburg University of Applied Sciences (HSF), Flensburg, Germany were pointed as R5, R6, R7 and R8 (Respondent 5, 6, 7 and 8),
- Two energy engineering students from Cape Peninsula University of Technology (CPUT), Cape Town, South Africa were identified as R9 and R10 (Respondent 9 and 10),
- Two solar energy students from Namibia University of Science and Technology (NUST), Windhoek, Namibia were given the codes of R11 and R12 (Respondent 11 and 12),
- Two electrical engineering students from Tshwane University of Technology (TUT), Pretoria, South Africa received the codes of R13 and R14 (Respondent 13 and 14), and
- Two wind energy students from Vaal University of Technology (VUT), Vandebijlpark, South Africa were determined as R15 and R16 (Respondent 15 and 16).

It should be noted that the gender issue was not taken into consideration as only two female students took part in the PEESA II Summer School.

The purpose of the PEESA II project Summer School was a cultural interaction together with an exchange of technological knowledge and experience in a competition between student groups. The PEESA II Summer School included the following events:

On Monday morning, the students had informative lectures about the partner universities and institutions as well as PV-system (photovoltaic system) installations together with simulation and calculation systems for solar panels. The students were also shown the roof with the installed PV systems owned by the university. On Monday afternoon, the intercultural and interdisciplinary working student groups were formed. Each group included four students from different universities and disciplines to ensure a higher exchange of technological and cultural knowledge. Therefore, four intercultural and interdisciplinary students' groups were organized:

- Group 1 involved one student from Hochschule Flensburg, one student from Hochschule Wismar, one student from Namibia University of Science and Technology and one student from Cape Peninsula University of Technology,
- Group 2 involved one student from Hochschule Flensburg, one student from Hochschule Wismar, one student from Namibia University of Science and Technology and one student from Cape Peninsula University of Technology,
- Group 3 involved one student from Hochschule Flensburg, one student from Hochschule Wismar, one student from Tshwane University of Technology and one student from Vaal University of Technology,
- Group 4 involved one student from Hochschule Flensburg, one student from Hochschule Wismar, one student from Tshwane University of Technology and one student from Vaal University of Technology.

Therefore, the students' groups are multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. Students' different cultural and educational experience emphasized the significance of each student's contribution to the analysis of their participation in an intercultural and interdisciplinary team.

The student groups' competition aimed to identify possible savings in one of the campus' buildings to reduce the total energy demand and reduce costs over the year. The students were free to bring in all ideas to rise up the level of energy efficiency. For the increase of the student groups' efficiency, on Wednesday the students visited the company 'Mustek' located close to Johannesburg. The company is one of South Africa's leading and biggest producer of computers and electronics and decided, due to the proposition of an autark energy supply, to build about 200 PV modules on the roof of their main building. A brief presentation about the background and some amounts of saved energy costs was followed by an inspection of the system. The students considered the visit as an impressing example for the efficient use of renewable energy. Another visit was done on Friday to

the science centre of the Vaal University of Technology, situated slightly outside Vanderbijlpark. The students were introduced different methods of using 3D printers that work with synthetic materials or even sand and the usage of metal working machines.

## Results of the Case Study

In order to analyse the students' evaluation of their participation in an intercultural and interdisciplinary team, the survey was based on the following question: What is your evaluation of your participation in an intercultural and interdisciplinary team?

Respondent 1, 4, 8 and 16 highlighted that due to the common accommodation of nearly all students the getting acquainted was a lot easier and the possibilities of working together were great. There have been some joint activities inside and outside the hotel. The intercultural exchange was and is a key priority in the PEESA II program and supported by all members like students, lectures and administrative staff.

Respondent 5, 9, 12 and 15 considered that the combination of exchange in technological knowledge and intercultural matters as well as the lore to have done something helpful for the environment made this a total success.

Respondent 2 and 6 informed that the mixture and diversity within the groups led to conclusive results and it was announced that these presented ideas would be submitted to the president of the Vaal University of Technology to discuss about their implementation.

Respondent 3, 7 and 14 discussed that on Thursday afternoon the group with the best and most innovative ideas was named and prized with a small present, afterwards some photos were taken.

Respondent 10, 11 and 13 emphasized that the first part of the PEESA II program was a certain success for all participants and everyone is looking forward excited to Part 2 in July.

## Findings of the Case Study

Summarizing content analysis (Mayring, 2004) of the data demonstrates that the respondent positively evaluate their participation in an intercultural and interdisciplinary team.

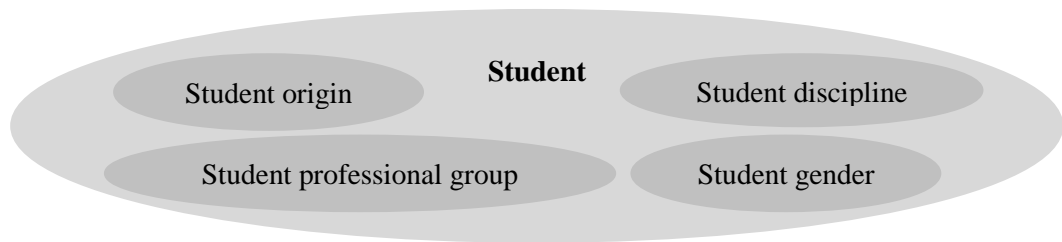
## CONCLUSIONS

The theoretical findings of the research allow outlining that the development of the organizational model of students' exchange is based on the interaction between the students who obtain the culture of different countries (or different origins) and different disciplines. Further on, Figure 6 presents the complemented organizational model of students' exchange based on the interaction between the students who obtain the culture of different origins, disciplines, professional groups and gender.

The findings of the empirical study allow concluding that the students positively evaluated their participation in an intercultural and interdisciplinary team within PEESA II Summer School.

The following hypothesis has been formulated: a level of students' positive evaluation of their participation in an intercultural and interdisciplinary team increases if

- students are involved in carrying out a joint interdisciplinary problem solution,
- a favourable educational (teaching, peer-learning and learning) environment for the enrichment of students' knowledge is organized,
- educational interaction between male and female students is increased that results in students' improved knowledge on an interdisciplinary problem solution.



**Figure 6: Complemented individual level of students' exchange.**

The present research has limitations. The inter-connections between the concepts of “culture”, “intercultural” and “interdisciplinary” have been set. Another limitation is the empirical study conducted by involving only the students of one PEESA II Summer School. Nevertheless, the results of the research, namely the elaborated organizational model of students' exchange based on the interaction between the students who obtain the culture of different countries (or different origins) and different disciplines, may be used as a basis of forming intercultural and interdisciplinary teams in other institutions. If the results of other institutions had been available for analysis, different results could have been attained. There is a possibility to continue the study.

Further research tends to analyse theoretical framework on forming intercultural and interdisciplinary teams. The search for relevant methods, tools and techniques for evaluation of intercultural and interdisciplinary teams is proposed. Further research tends to implement empirical studies in other respondents' groups. A comparative research and studies of other countries could be carried out.

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