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Sustainable Development Goals Meet "Third Mission": The Engineers Without Borders Challenge in Germany

Ms. Freya Willicks, RWTH Aachen University

Freya Willicks is researcher at the Center for Learning and Knowledge Management (ZLW) in the Cybernetic Labs IMA/ZLW & IfU at RWTH Aachen University, Germany (e-mail: freya.willicks@ima-zlw-ifu.rwth-aachen.de).

Ms. Valerie Stehling, IMA/ZLW of RWTH Aachen University

Valerie Stehling is a research group leader at the Institute of Information Management in Mechanical Engineering and Center for Learning and Knowledge Management.

Dr. Max Haberstroh, RWTH Aachen University

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Freya Willicks, Valerie Stehling, Max Haberstroh, Frank Hees

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Abstract

The German university teaching system has been in a state of constant change since the Bologna reform. For some time now, it has also been shaped by concepts such as the Third Mission, the idea of understanding civil society engagement as a further mission of universities alongside research and teaching. In addition to that, key challenges of the 21st century such as globalization, climate change and lack of sustainability are coming to the focus. Their significance is also evident in the UN’s Sustainable Development Goals (SDGs).

In order to sensitize students to the concept of civic engagement on the one hand and to spread knowledge among students about the SDGs on the other, innovative approaches are needed. One approach to address these challenges is the Engineers Without Borders (EWB) Challenge. Within the EWB Challenge, real-life problems related to development cooperation in developing countries are integrated into lectures and it is the students’ task to find feasible solutions. The most promising solutions are then selected by EWB and implemented in the developing countries.

This paper presents the current state of implementation of the EWB Challenge in Germany. A typical task of a completed EWB Challenge with the focus on efficient cooking and heating in rural areas in Africa is presented and an exemplary solution concept of one student group is provided. The example shows how the following goals can be achieved with the illustrated implementation: Interdisciplinary work, reflection on the use of technology in developing countries and the motivating combination of theoretical knowledge and practical relevance. The example also illustrates how civil society engagement can be brought to university. To analyze the effects of the EWB challenge on the participating students, a two-part evaluation (pre- and post-evaluation) has been conducted in the course of the Challenge’s implementation at additional German universities. The focus of the evaluation lies on a comparison of the participants' assessments of their skills and abilities before and after their participation in the EWB Challenge. This work in progress paper explains the structure of this evaluation in detail.

1. Introduction

The German university teaching system has been in constant change since the Bologna reform (a European-wide process to ensure coherent and comparable education qualifications). It is becoming increasingly important to intensify the learning process, improve learning outcomes and ultimately improve the quality of teaching (Hochschulforum Digitalisierung 2016). Furthermore, concepts such as the "Third Mission" are on the rise: the idea of understanding civil society engagement as a further mission of universities alongside research and teaching is increasingly being discussed and disseminated in Germany (Schneidewind 2016).

In addition, key challenges of the 21st century are getting into focus – globalization, climate change, lack of sustainability and social inequality (Belu et al. 2016; Boyle 2004). Their significance is also reflected in the Sustainable Development Goals (SDGs), which were designed by the UN as part of the Sustainable Development Agenda 2030 and became effective in 2016 (Christian Kroll 2015). Under the title "Transforming our World: the 2030 Agenda for Sustainable Development", the 193 member states of the United Nations set 17 goals that cover a wide variety of topics ranging from climate change mitigation, poverty reduction, education and health improvement to the protection of the oceans and ecosystems (Welthungerhilfe 2016). The "Agenda 2030" is the first internationally binding agenda in which these issues have been addressed in a universal and transnational manner, involving developing, emerging and industrialized countries. The agenda was considered to be very promising; at the same time, however, it was criticized that little concrete implementation strategies and indicators were specified (Institut für transformative Nachhaltigkeitsforschung 2015).

Higher education in engineering can use the SDGs to discuss and reflect on topics such as sustainability, climate change and global technology use with future engineers on the basis of current developments. However, since sustainability is an issue that affects all disciplines, a multidisciplinary approach is also needed. Future engineers must therefore also be prepared to find problem-oriented solutions and work in interdisciplinary teams (Multrus 2009).

In order to sensitize students to the concept of civic engagement and increase their interest in voluntary work for development cooperation on the one hand and to train them for interdisciplinary cooperation on the other, complex and innovative approaches are required. One educational concept to address these challenges is the Engineers Without Borders (EWB) Challenge (Buys et al. 2013). Within the EWB Challenge, real world problems of development cooperation are integrated into lectures and it is the students' task to find feasible solutions. The most promising solutions are then selected by EWB and implemented in the developing countries.

This paper presents the current status of the implementation of the EWB Challenge in Germany. In this paper, the concept of the EWB Challenge is explained concisely and the implementation process conducted so far is illustrated (section 2). Furthermore, the didactic basis of the EWB Challenge at RWTH Aachen university is explained (section 2.1). Thereupon, a task of a completed German EWB Challenge (section 2.3) and exemplary solution concepts (section 2.4) are presented in order to better understand the process and implementation of the EWB Challenge at RWTH Aachen university. Currently, a newly developed two-part evaluation (pre- and post-evaluation) is being carried out to evaluate and analyse the participants' assessments of their skills and abilities before and after their participation in the EWB Challenge. The Work in Progress Paper explains the structure of this evaluation in detail and provides first results (section 3). Finally, a conclusion and an outlook are given (section 4).

2. The Engineers Without Borders Challenge in Germany

2.1 Process of an EWB Challenge run

The basic task of the participating students of the EWB Challenge is to develop sustainable solutions and ideas for problems identified by the partner organisation EWB in developing

countries (Buys et al. 2013). In close cooperation with the local population of the developing country, EWB work on implementing the most promising concepts. In its country of origin, Australia, the EWB Challenge has become an integral part of engineering studies with over 18,000 students at more than 31 universities participating every year (Cutler et al. 2011). It is also widespread in New Zealand and Great Britain. In Germany the EWB Challenge has only been implemented at two universities at this stage. The nationwide dissemination of the concept is still under development.

In the winter semester 2012/13, the EWB Challenge was tested in Germany for the first time. Since then, it has been regularly practiced in several courses at RWTH Aachen university (Willicks et al. 2017a). Tasks that have previously been presented to the students were, for example, the technical design of low-tech tools for the material supply of biogas plants (country of application: Tanzania) or the optimization of emergency shelters after strong earthquakes (country of application: Nepal). Based on the Australian model, the Challenge, at RWTH Aachen university, follows six phases (cf. fig. 1):

1. Engineers Without Borders (EWB) and the project team identifies relevant topics
2. EWB and the project team composes info material for students and lecturers
3. Lecturers integrate the topics into their lectures
4. In teamwork, students develop ideas and create solution concepts and afterwards write reports
5. Students present their concepts in front of a jury
6. EWB and the project team supports the implementation of the best ideas in the relevant developing countries

Fig. 1: Typical process of an German EWB Challenge run

2.2 Didactical concept: Problem-based Learning

The didactical core of the EWB Challenge at RWTH Aachen university lies in the concept of problem-based learning (PBL). PBL aims at improving learning through encouraging the students to find their own solution to a given realistic problem of a certain complexity (Allen et al. 2011). Independent and problem-focused team work and self-reflection are central elements of the PBL concept (Hung et al. 2008). The method is not only chosen to foster the acquisition of content knowledge, but also the acquisition of generic knowledge, such as intercultural skills or teamwork (Wood 2003). For those reasons, PBL was identified as the ideal didactic basis for the EWB Challenge at RWTH Aachen university.

The PBL concept becomes particularly relevant in the fourth phase of the EWB Challenge at RWTH Aachen university (see fig. 1, picture 4). Typically, the fourth phase proceeds as follows: Participants are given a wide range of tasks to choose from. For example, in a previous EWB Challenge that was held for Nepal, one of the tasks focused on the development of

technical concepts for optimizing emergency shelters with regard to the ventilation and isolation situation. In the other task of the same challenge, the students were asked to develop and test marketing and training concepts that aimed at informing the local population about earthquake-proof building as a preventive measure.

In the EWB Challenge at RWTH Aachen university, the students organize themselves in teams. Each team can choose one of the different tasks and any number of teams can work on the same task. In this way, the team can also select a problem that strongly reflects the interests and professional background of the group and its members. In addition, it is up to them to choose their own methods and approaches when designing the solutions. What all the subtasks of an EWB Challenge have in common is that they have an engineering background, but also require interdisciplinary approaches. Completing the task therefore not only requires self-determined work but also skills beyond what is taught in regular engineering classes, which is also typical for PBL (Wood 2003). This way, the social responsibility of engineers in a globalized world and the necessity of a sustainable use of resources are discussed.

At the beginning of the semester, students are informed about development cooperation and the SDGs in general as well as EWB's work in particular. In addition, the theoretical background knowledge on the subject of the original course is given. At RWTH Aachen university, for example, the EWB Challenge is integrated in the course "Problem solving behaviour 1". One of the central competences nowadays students have to possess during their course of studies, as well as in the globalized working world, is the ability to find creative solutions for complex problems. To this end, various problem solving models are introduced at the beginning of the seminar, e. g. the problem solving model by Sell and Schimweg (1998). This is a model developed by the engineering sciences and according to which one has to define the *current* and the *target situation* for a problem and determine *operators* with which you can achieve a step-by-step problem solving. During the further course of the semester, students will then have to work on one of the subtasks of the EWB Challenge using one of the presented problem solving models. Usually about 15 students attend the course per semester (average values of the last three years), most of them do their Master's degree. The group is usually very interdisciplinary, with students of biology, environmental engineering, civil engineering, political science and more. About 70% of the students of the last years were male.

As typical for the concept of PBL (Wood 2003), the lecturers mainly act as supporting tutors during the EWB Challenge. In addition to the possibility of contacting the lecturers during the lecture, students can also contact the lecturers via an online forum that was specially created for the EWB Challenge. This online forum is open to all participants of the EWB Challenge, making it accessible to students of all participating lectures and universities. This can also encourage communication between students from different universities. With the help of the online forum, participants of the EWB Challenge have also the possibility to contact representatives of EWB at any time during the semester. In this way, they can obtain specific information e.g. about the situation in developing countries. Frequently asked questions are for instance related to the availability of certain resources in the developing country or related to cultural characteristics.

2.3 Example Tasks: The EWB Challenge 2016/17

Each year a new EWB Challenge and relevant subtasks are developed within the second phase of an EWB Challenge run at RWTH Aachen university and in cooperation with EWB Germany (see fig. 1, page 3). In this way, current developments in EWB's project work or current world political activities can be addressed. Students are usually provided with a fact sheet containing an overview of the current situation in the respective developing country. This overview is supposed to give them an insight into the scope of the current EWB Challenge and the background in the respective developing country. In addition, various fact sheets are provided for the individual subtasks. All this information is also presented on the project website and additionally visualized by graphics and pictures and further data from EWB.

In order to provide a more precise understanding of the German EWB Challenge, the overview information as well as the main parts of the subtasks of the last German EWB Challenge run (terms 2016/17 and 2017) are presented in the following. Originally, they were written in German, but for the purpose of this paper the text was translated into English.

Engineers Without Borders Challenge 2016/17: Efficient solutions for cooking and heating in rural areas in developing countries

Overview

In developing countries, biomass is extremely important for energy production. In most African countries, around 90 percent of households cover their daily energy needs with biomass. Especially in rural areas, biomass is usually the only available energy source. 2.7 billion people worldwide depend on wood, charcoal or plant remains for daily cooking and heating. But in most cases the biomass is burned inefficiently. For example, cooking is often done indoors over an open fire. The population cooks with firewood on the traditional "cook stove". These traditional cooking solutions do not include a fireplace and can therefore lead to increased health problems. Among other things, smoke can cause lung and eye diseases. These health problems mainly affect women and children, as they spend most of their time near the home herd. According to calculations by the World Health Authority, in 2015 4.3 million people worldwide died as a result of extreme smoke pollution caused by the inefficient combustion of biomass.

The effects on the environment are also serious. The deforestation of natural forests leads to erosion and desertification of whole areas. Fuel becomes a scarce commodity and household expenditure on firewood increases. In some families, women and young girls have to spend a lot of time collecting firewood. A large part of the population is not aware of the ecological problems arising from this, nor of the need to use modern, cost-effective and energy-efficient technologies. The importance of a decentralised, secure and clean energy supply for economic and social development is often underestimated politically.

First subtask: Technical solution

1. Problem definition: The aim of the task is to develop a solution concept to show how energy-efficient cookers can be built in a cost-effective way. Any culture or country in which the use of the cook stove is common in rural areas can be used for the case study. In addition to the factor of a more efficient cooking option, other factors such as health, price, accident risk and possibilities of dissemination through standardized construction methods are to be taken into account when finding solutions.

2. Tips for solution: All solutions should be cost-efficient and locally adapted, i. e. developed with locally available materials wherever possible; they should also be designed for a long shelf life. Furthermore, regional cooking habits and ingredients, safety, the use of solid fuels, and reparability should be considered.

Second subtask: Marketing and training concepts

1. Problem definition: Savings in fuels, reduced smoke emission and reduced risk of injury are advantages efficient cooking technologies have over the traditional "cook stove". Yet, it must be considered that initial financial investments need to be taken to acquire the technology.

The initial costs are relatively high compared to a free solution like the cook stove. Wood can initially be obtained free of charge, but it is often time consuming and the health risks are only noticeable in the longer term. For this reason, it is necessary to persuade the poorer households to switch to more efficient cooking technologies. Even simple stoves can be produced free of charge from local materials. By doing so, it is also important to consider that there might be concerns on the side of the local populations when it comes to changes in the way they live in their households.

2. Tips for solutions: Development cooperation projects should not contain a large proportion of subsidies; if the measure is designed for sustainability, it can spread further if the target groups' own initiative is successful. Nevertheless, persuasion is often required. This can be done, for example, by introducing the technology, training courses and raising awareness of dangers.

A marketing concept is to be devised. The aim is to provide information on health risks in a way that is appropriate to the target group and to identify the advantages and possible disadvantages of more efficient cooking technologies. In this context, the families should be treated in a culturally sensitive way, in order to eliminate possible doubts.

Third subtask: Performance measurement

1. Problem definition: The success of a spread of modern cooking technologies depends on the actual acceptance of the users. In addition to the promised efficiency, the technology must fit in with the realities of everyday life. Usual meals with appropriate cooking times, the possibility to heat several pots or using local materials are aspects that must be taken into account for a successful implementation.

2. Possible starting situation: For a pilot project, 200 efficient stoves are to be sold in a region with the help of a credit program. Through the savings of solid fuels, the stoves are to be repaid within 12 months. The stoves are built and sold by a micro-company, which has been trained beforehand. The users are trained in the handling of the system during information events and through personal instructions when buying.

At the end of the performance review, conclusions should be drawn and recommendations made with regard to sustainability, the "lessons learned" and the overall success. Discuss and develop A scenario to evaluate a project for efficient cooking should be discussed

and developed. Which questions are important, how can we proceed, how can we process the information gained and make it usable for future projects?

2.4 Example solution concept

In the context of this paper, only one of the student concepts of the Challenge 2016/17 is described. A solution concept of an interdisciplinary student group consisting of a student of ecotoxicology, a student of environmental engineering and a student of civil engineering is presented, as the group is interdisciplinary on the one hand and on the other hand its solution was found to be very good. The group chose subtask 2 for its project work within the EWB Challenge.

As their exemplary developing country the group chose Kenya. By means of a literature search and based on the problem solving model according to Sell/Schimweg, the group compiled the *current state* of cooking and heating in rural areas in Kenya as well as the current economic, social and environmental circumstances in Kenya. Using group work, they also developed the *target situation*. In an expert interview with a representative of EWB Germany, they identified the Participatory Rural Appraisal (PRA) as a suitable concept. The PRA is a well-known method of development cooperation, which aims at incorporating the knowledge and opinions of rural people in the planning and management of development projects and programs.

Thereupon – in the sense of the problem solving model according to Sell/Schimweg – the students collected supporting and opposing forces, which are to be expected in the implementation of their concept. The student group determined several *operators* for achieving a step-by-step problem solving: With the help of mind maps and group discussions, several suggestive questions were set as a first step in the implementation of their training concept. These questions are supposed to be provided to women and men as part of a training course on efficient heating and cooking, so that the local people themselves understand the dangers of the cook stove and the benefits of more efficient technologies. To communicate knowledge about the toxicity of fuel emissions, especially to the target group of younger children, the group chose "fables" as an *operator* for the second step of their concept. As part of the EWB Challenge, the project group developed two fables with typical African characters. The marketing concept presented in the students' thesis involves cooperation with local teachers who could integrate these fables into the curriculum of the primary school. The pupils can pass on the orally told tales while eating together with their families and thus also encourage their parents to reflect upon the stories. In later life situations, the children could also be confronted with the problems raised by the fables and, if necessary, transfer the described solutions.

The work of the student group was characterised by an interdisciplinary approach, as each student brought his or her disciplinary way of thinking and methods into the group work. In addition, it was characterised by the use of many different methods (mind-map, expert interview, fables etc.), which the students learned for the EWB Challenge. They assessed the current political and social situation in Kenya and gained knowledge about the PRA method, which is an often-used concept in development cooperation. They also dealt with the issue of how to create acceptance for technology among Kenya's rural population. The students used theoretical knowledge to achieve practical results: Based on the individual components of

Sell/Schimweg's problem solving model, they developed a training concept that addresses different target groups. Especially the self-written fables show a very high level of creativity and indicate the students' great commitment and motivation. In qualitative feedback discussions after participating in the EWB Challenge, the students told the lecturers that they saw the EWB Challenge as a very interesting and innovative opportunity to work on the contents of the course. They admitted that they first found the "very openly held" tasks challenging, because typically university tasks are designed differently. But in the end, it was precisely this openness that gave them the opportunity to contribute their own sights and ideas. They said that they would like to see more courses in this form and that they had a lot of fun with the course.

The example shows that the aims of the German EWB Challenge – interdisciplinary work, reflection on the use of technology in developing countries and the motivating combination of theoretical knowledge and practical relevance – can be achieved with the presented implementation. In this way, civil society engagement is also brought to the university as the third mission beside research and teaching.

3. Evaluation of the EWB Challenge

Since its first run, the EWB Challenge has been continuously evaluated by a standardized questionnaire that has been developed especially for this purpose and that the participating students completed at the end of each semester. The structure of this evaluation and the results have already been discussed in detail (Willicks et al. 2017a; Willicks et al. 2017b). To sum up, it can be said, that the overall quality of the EWB Challenge at RWTH Aachen university was marked as "good". Asides from that, the analyses also indicate that the students most benefit from a great amount of gained knowledge and their improved ability to adapt technologies depending on the situational context and the underlying social and cultural structures.

The results of this evaluation were very informative and enabled a continuous optimization of the EWB Challenge at RWTH Aachen university. Nevertheless, the transfer to a second German university, Technical University Dortmund, which took place in the winter semester 2017/18, was used as an opportunity to update the evaluation. The focus is now less on the content of the course in which the EWB Challenge at RWTH Aachen university was originally integrated first (problem solving behaviour 1). Instead, the new evaluation addresses the question whether the participants acquired general skills future engineers need to develop, such as the ability to break down a problem into several steps, project management skills or presentation skills.

The new evaluation is realised by a pre- and a post-survey at the beginning and end of the semester. This is made possible by each participant generating an individual code so that the first and second questionnaires can be directed to each other. Thus the survey is anonymous but still allows the comparison of a participant's answers and can reveal a change in the participant's skills, competences and opinions. Therefore, participants are not only asked to asses the improvement of their skills. Instead, a general assessment of their competences is requested in order to be able to determine whether the skills have also evolved objectively in comparison with the answers of the pre-evaluation.

The newly developed evaluation is presented in table 1.

Table 1: Post-evaluation of the German EWB Challenge

Course: Engineers without Borders Challenge 2017/18		**Fully applies**	**Largely applies**	**Neither…nor**	**Does rather not apply**	**Does not apply at all**
1.	**General Part**					
1.1	I look forward to working as an engineer.	O	O	O	O	O
1.2	Professional engineers have a high social responsibility.	O	O	O	O	O
1.3	In my opinion, it is more effective to solve complex problems in group work	O	O	O	O	O
1.4	I have the feeling that my action and dealing actuate something and increase the quality of life.	O	O	O	O	O
1.5	I am interested in development cooperation.	O	O	O	O	O
1.6	I have the feeling that my participation in the seminar contributes something to development cooperation.	O	O	O	O	O
1.7	I have voluntarily commited myself to development cooperation before.	O	O	O	O	O
1.8	I can imagine, to (further) commit myself to development cooperation in the future.	O	O	O	O	O
2.	**My attributes**					
2.1	The knowledge I acquired during my course of studies can easily be put into practice.	O	O	O	O	O
2.2	My presentation skills are very good.	O	O	O	O	O
2.3	For me, project work does not cause any difficulties.	O	O	O	O	O
2.4	I am able to work purposefully.	O	O	O	O	O
2.5	I dare to find constructive solutions for a problem.	O	O	O	O	O
2.6	I have an idea about the fact how to structure problems into sub-problems and to solve them systematically.	O	O	O	O	O
2.7	I am familiar with problem solving models that can be useful for development cooperation.	O	O	O	O	O
2.8	I am able to adapt technologies to the given situation, as well as to cultural and social structures.	O	O	O	O	O
2.9	I can make a good estimate of the possibilities I have, in order to have an effect on disadvantaged regions.	O	O	O	O	O
3.	**Development Cooperation**					
3.1	The ability to work in a team is very important for development cooperation.	O	O	O	O	O
3.2	I am able to estimate which aspects have to be considered in development cooperation.	O	O	O	O	O
3.3	I am able to estimate which special problems disadvantaged regions are confronted with.	O	O	O	O	O

3.4	I am able to estimate which aspects of intercultural cooperation have to be considered.	O	O	O	O	O
3.5	The „Engineers without Borders Challenge“ contributes to development cooperation.	O	O	O	O	O
4.	**By participating in the „Engineers without Borders Challenge“ I…**					
4.1	… learned more about development cooperation in general.	O	O	O	O	O
4.2	… learned more about the work of engineers without borders.	O	O	O	O	O
4.3	… was able to make a relevant contribution to development cooperation.	O	O	O	O	O
4.4	…- together with my team - was able to find a solution that increases someone’s quality of life.	O	O	O	O	O
4.5	… productively worked in an (interdisciplinary) team.	O	O	O	O	O
4.6	… improved my problem solving behaviour.	O	O	O	O	O
4.7	… improved my presentation skills.	O	O	O	O	O
4.8	… improved my project management skills.	O	O	O	O	O
5.	**The „Engineers without Borders Challenge“…**					
5.1	… increased my interest in the work of an engineer. (scientific/technical area)	O	O	O	O	O
5.2	… supported independent actions.	O	O	O	O	O
5.3	… increased my social responsibility/my feeling of social influence.	O	O	O	O	O

Since both evaluations contain mainly the same questions and items, only the post-evaluation is displayed here. Changes between the pre- and the post-evaluation concern part 4. In the pre-evaluation, the same items as in the post-evaluation are used to query expectations that have to be answered on a two-scaled scale ("Yes" and "No"). Following this, item 4.1 e.g. would be “By participating in the EWB Challenge I expect to learn more about development cooperation in general”. Changes between the two evaluations also concern part 5. Since this part is intended to evaluate the EWB Challenge after participation, it can only be found in the post-evaluation. Furthermore, some demographic data (age, gender, course of study and highest level of education) are only collected once in the post-questionnaire.

At the time of writing this paper, only the pre-evaluation was conducted for the first time. A total of 32 questionnaires were completed in two courses at the two participating German universities. Of these, only one participant commits him/herself voluntary to development cooperation (item 1.7 fully applies, cf. fig. 2). A success of the EWB Challenge would be if more students were interested in getting involved in development cooperation after participation since this also is a part of civic engagement. This should be examined after the second questionnaire has been conducted. A significant result is also that only one participant totally agrees with the statement that the knowledge he/she acquired during his/her course of studies can easily be put into practice (item 2.1, cf. figure 3). The hypothesis at this point is that

this number should be higher in the post-evaluation as the EWB Challenge illustrates to the participants in a very concrete way how they can put their theoretical knowledge into practice.

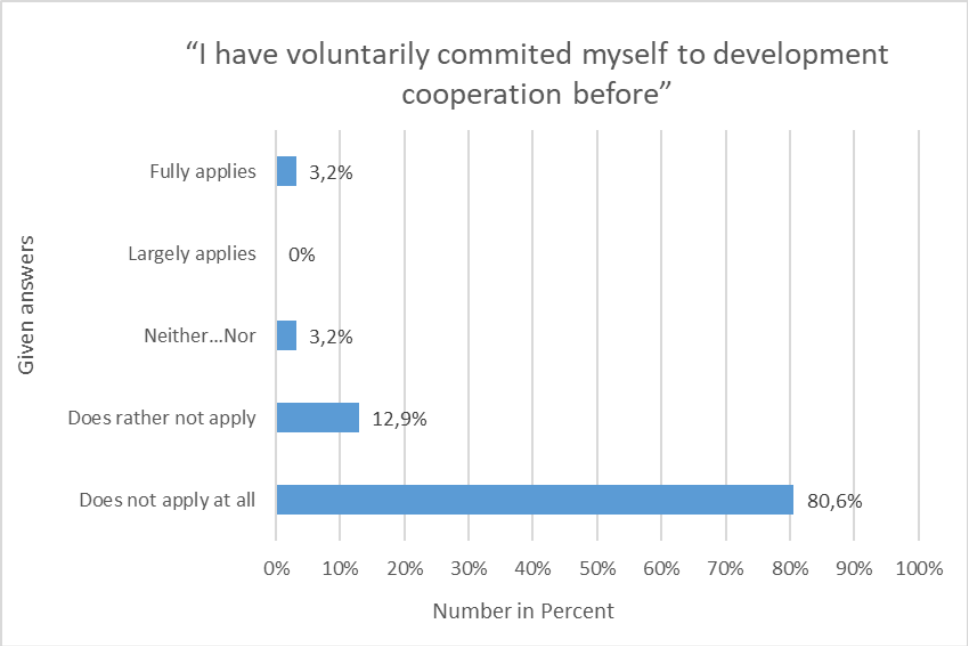

Fig. 2: Answers to the question „I have voluntarily commited myself to development cooperation before"

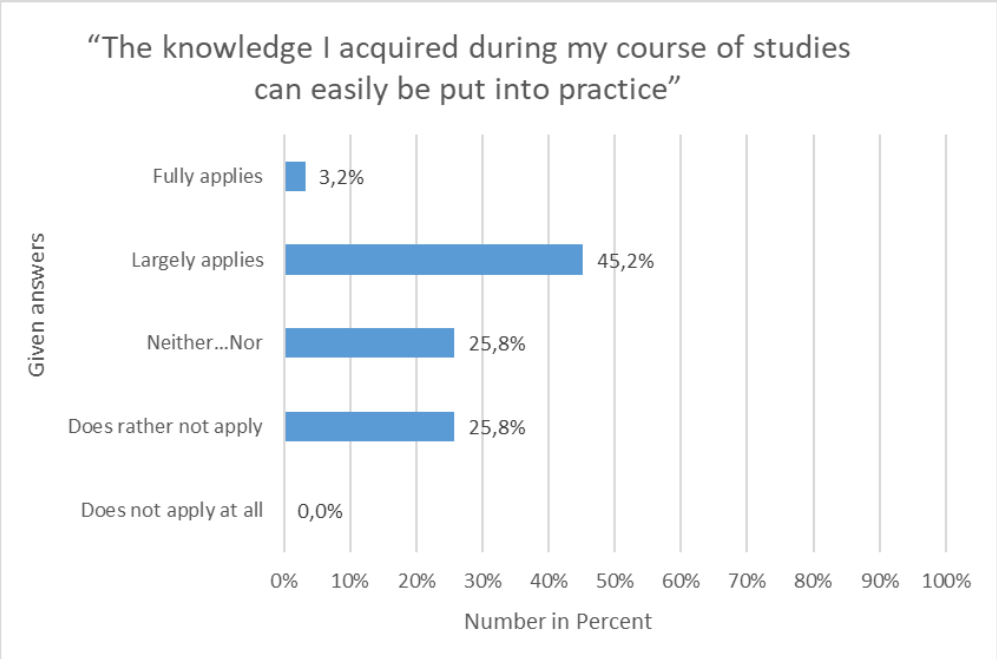

Fig. 3: Answers to the question "The knowledge I acquired during my course of studies can easily be put into practice"

With regard to part 4 and the participants' expectations in the EWB Challenge, it becomes evident that the work of EWB is in the focus: 100% of the participants expect to learn more about the work of the non-profit association (item 4.2). However, 97% of the participants also expect that they learn more about development cooperation in general (4.1), productively work in an (interdisciplinary) team (4.5), expect to improve their problem solving behaviour (4.6) as well as to improve their project management skills (4.8).

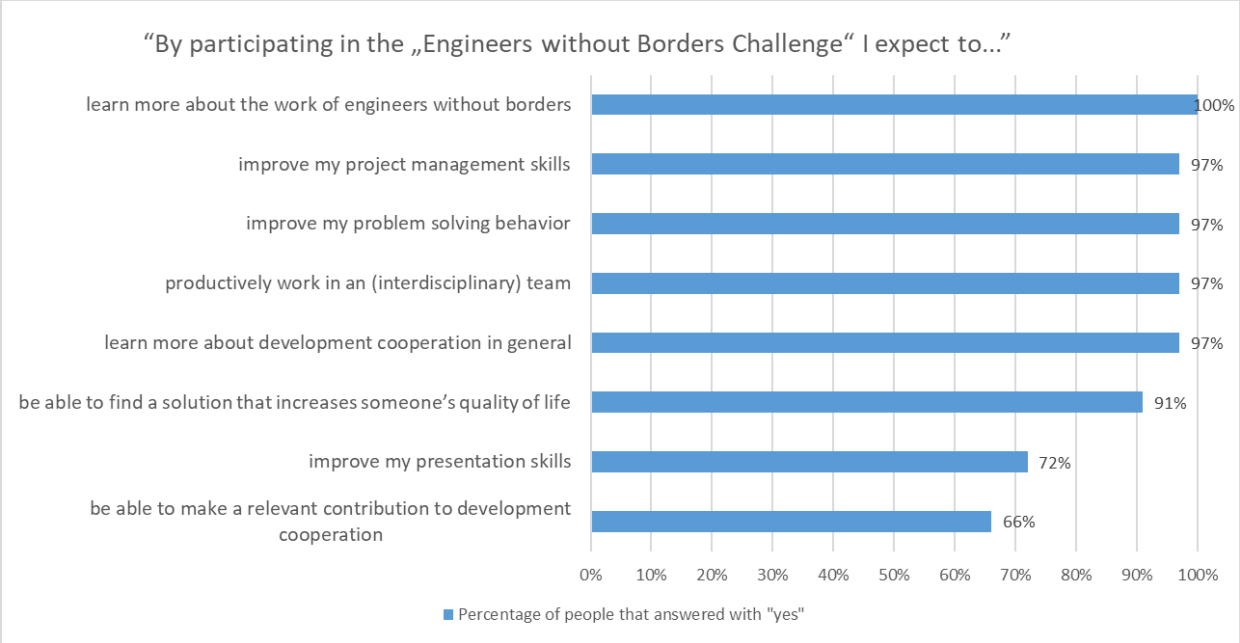

Fig. 4: Average answers to part 4 "By participating in the „Engineers without Borders Challenge" I…"

Due to the work in progress character of this article and the fact that the first implementation of both parts of the new evaluation is not yet complete, no more results can be presented so far.

4. Conclusion and Outlook

This paper aimed at presenting the current status of the implementation of the EWB Challenge in Germany. Therefore, the typical EWB Challenge process run was explained. At RWTH Aachen university, the EWB Challenge process is connected with the didactical concept of PBL, which fosters not only the acquisition of content knowledge, but also the acquisition of generic knowledge. To provide a more precise understanding of the German EWB Challenge, the tasks of a completed German EWB Challenge and exemplary solution concepts were presented. The illustrated student concept was characterized by the acquisition of content knowledge as well as the use of teamwork, interdisciplinary methods and the work on intercultural issues as well as issues like technology acceptance. Therefore, it illustrates how the aims of the German EWB Challenge concept can be achieved: the integration of the EWB Challenge in existing courses such as "Problem solving behaviour 1" creates an innovative combination of theory and practice through which the students acquire not only specialized expertise but also know-how on topics like interdisciplinary teamwork, project management etc. Through working on specific real-world problems and the additional reflection on global

development goals, the lectures of the EWB Challenge are characterized by a high topicality and a high applicational relevance.

It is precisely for this reason that it is necessary in the future to improve the dissemination and visibility of the EWB Challenge in order to promote this opportunity for innovative teaching at other universities. A measure has already been taken in this direction: After the EWB Challenge had only been implemented at one university in Germany for some time, it was transferred to another German university in the winter semester 2017/18 and integrated into an existing course there.

The transfer was also used as an opportunity to update the evaluation concept of the EWB Challenge. The new evaluation aims at gaining more detailed insights into the effectiveness of the EWB Challenge in German universities and lectures. This can also serve not only to further optimize the German EWB Challenge, but can also be an opportunity to prove its effectiveness even more precisely, in order to inform more universities about the EWB Challenge and attract them to participate.

So far, concepts such as the "Third Mission" in Germany are generally only adopted and disseminated hesitantly. It is only in recent years that the idea of seeing civic engagement as another mission of universities alongside research and teaching has been articulated in Germany. However, there is a rising demand for implementation possibilities. Therefore, it is to be expected that this concept will become more and more integrated in German universities. The EWB Challenge is an application example in this context. Through the participation of other universities, it is also conceivable to participate in nationwide competitions based on the Australian model. In these competitions, the best student teams could be selected. This could also be an additional motivation for the participating teams.

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