

Early Career Support for Biomedical Exchange Students with an International Mentor-to-Mentor Concept – The Biomedical Education Program (BMEP)

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Abstract. In medicine, many international exchange opportunities exist, yet often only towards the end of the course of study. Opportunities for students to gain high-level international research experience early during the studies are rare. A good student-mentor relationship during a research stay abroad is a key factor for scientific success. The aims of this paper are to report on an international exchange and education program that has funded more than 700 students and has been carefully developed and advanced over more than 40 years, its mentor-to-mentor concept and potential success factors for building and maintain such programs. A summary of the history, the concept and the experiences of students is provided, along with a discussion of evaluation results and success factors. The Biomedical Education Program (BMEP) team has – within the last seven years of leadership by the authors – selected and funded 83 German students from different biomedical studies who went abroad for research projects. Preliminary evaluation results show a high degree of satisfaction with the program and its mentor-to-mentor concept, which we deem to be the key to success. Further factors include continued funding, determination, self-organization and assertiveness, an excellent alumni network and a meticulous selection process for both, students and hosts. Further, more detailed evaluation of survey results has to follow. Our results may support the build-up of similar exchange programs.

Keywords. education, medicine, exchange programs, mentoring

1. Introduction

In the field of medicine, many exchange programs exist that offer students the opportunity to stay abroad for some time, to gain experience at other medical faculties

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and healthcare systems. Mostly, these programs, such as the European ERASMUS+ program (<https://erasmus-plus.ec.europa.eu/funding?>), are based on bilateral university or faculty partnerships, that guarantee mutual recognition of single study course achievements, in the form of certificates of equivalence or similar documents. This is necessary, as several countries have no ECTS point systems in medicine, often being a subject with state examination. Other opportunities are internships or placements as clinical associates, often within the second part of the studies or at the very end. To the authors' knowledge, for students who wish to gain experience in scientific work early in their course of study or who wish to embark on a doctoral thesis, there is little to no choice for supporting serious, high-level scientific projects with excellent supervisors abroad.

Excellent mentoring has repeatedly been reported as a key success factor for exchange programs in medicine and educational programs alike. Bad mentoring or neglect of mentoring may result in unprofitable, frustrating or even deterrent experiences [1]. Successful mentorship, on the other hand, is characterized by dedication and motivation, good communication, clear definition and mutual understanding of goals [2]. In particular, mentoring by experienced, top clinicians and clinical scientists is regarded as especially beneficial [3].

With the goal to provide young academics in medicine with an optimal an early start into a scientific career in medicine, the German nephrologist Prof. Dr. Hilmar Stolte founded the Biomedical Exchange Program (BMEP) in 1979. To ensure optimal mentoring, the program follows the concept of a mentor-to-mentor approach, meaning that the student is supervised abroad not only by her or his local, foreign mentor, but also by a home mentor. Both mentors previously agree on a joint scientific project and – communicating with both – the student writes a comprehensive scientific project outline for application for funding. Until Prof. Stolte's death in 2015, the program had continuously supported more than 700 students in this way, thus building a network of excellent scientific institutions across the U.S., Canada and Germany, and, more important, of excellent scientific mentors. A long-term study, spanning over 30 years, has shown the tremendous success of the program, with more than 30% of participants attaining leadership positions in clinical care or science. Since 2015, the program has been led and developed further by the authors.

The aims of this paper are to:

- report – focusing on the time since 2015 – on the advancement of BMEP and its mentor-to-mentor concept, and to
- discuss potential success factors by summarizing exemplary feedback reports from our students/ grant recipients.

2. Methods

The authors give a summary of the basic concept and the history of the program and its pillars. They further provide exemplary feedback given to them by the grant recipients and, following up on this input, discuss potential factors of success for such exchange and educational programs. We will in particular focus on the mentor-to-mentor concept, which we deem the key to success.

3. Results

3.1. BMEP History and long-term study

BMEP was founded at the University of Connecticut in 1979 (Figure 1a) and led as an externally funded exchange program by Prof. Hilmar Stolte until 2015. It addressed students of medicine and biomedical studies who stayed abroad for one academic year, i.e. nine months. The tremendous success of the program was demonstrated by a long-term follow-up study of its students, spanning 30 years [4]. Results (n=675) showed that 96.5% of students attain a doctorate, 56.8% pursue an academic career and, 20+ years after the BMEP funding, 32.1% have reached the highest academic leadership degree (professorship, PD) [4].



Figure 1a and b. Left: Founding session of BMEP in 1979 at the University of Connecticut, U.S. (John Boylan, Hilmar Stolte and Robert Massey, source: *Biomedical Sciences Exchange Program – Academic Year 2009-2010 yearbook*); Right: BMEP class of 2021 at Hannover Medical School, Germany (source: *MM*).

3.2. BMEP today: Mentor-to-Mentor Concept and selection process

In several steps, the authors MM, TD and HCP have been granted funds for the continuation of the program by the German Academic Exchange Service. Applicants from Germany can now apply – via an online portal – for host institutions all over the world, broadening the opportunities to build academic collaborations (‘bridges’) with excellent institutions, no matter where. Furthermore, the program is open not only to medical students, but to other students from associated biomedical studies, and increasingly from Medical Informatics, bioinformatics and biomedical engineering (8 since 2017). Since taking over the program in 2015, BMEP has selected and funded 83 German students in the U.S., the United Kingdom, Canada, Israel and South Africa. Only one student quit the program for personal reasons after three months.

The key pillar of BMEP is the consequent implementation of a mentor-to-mentor concept. This means that every student who applies for BMEP funding and admission to the program will not only have to prove that she or he has a competent mentor abroad, but also a mentor at the home university. Both agree, together with the student, on an elaborated research schedule for the time abroad, which is described in detail in a research proposal. In addition to this, a clear statement by the host is demanded, providing details about the support infrastructure, tools, available data or models along with a statement about the mentoring provided. Very often, the two (or more) mentors have worked together previously.

Apart from implementing the mentor-to-mentor bridge, we have set up a rigorous two-step selection process, which includes scoring the applicants on the basis of their marks, the quality of their research proposals, their letters of motivation and their

extracurricular activities. Top applicants are subsequently invited to face-to-face interviews with the BMEP team, in which further assessment is performed, including, e.g., linguistic skills, determination, ability for self-organization and experiences in necessary scientific methods. Utmost attention is paid to previous personal contacts with hosts, as an indicator for a working and lasting mentor-to-mentor relationship.

3.3. Success factors and scholarship students' feedback

As mentioned above, one key factor is a trustful relationship between host mentor and student, complemented by the home mentor. Apart from this, and by taking into account several hints from the feedback from our students, we consider the following points as particularly important:

- Selection of excellent host mentors in excellent institutions: We pay attention to the track record of host mentors and their reputation [5]. Learning from 'big shots' [3, 6], in direct contact, motivates and improves the chances for conducting excellent research and achieving excellent publications.
- Alumni network: A network of alumni that are willing to support young academics in finding attractive research projects and locations is another very important asset, which has frequently been mentioned by our students. Our alumni have founded a non-profit association that organizes meetings, during which students who have just come back from abroad and alumni share their experiences and provide useful information to new students.
- Continued funding: Without stable financial resources and the trust of the funding organization in the organizers, such a program would not be possible and could not build up a reputation. Duration here is a success factor.
- Enthusiasm and self-organization: Motivation of the hosts needs to be matched by that of the students, who also need a high degree of determination, self-organization and a healthy amount of assertiveness to succeed in a competitive research environment [2]. While this is difficult to assess in application documents, in our experience, in personal interviews, this becomes more apparent.

Preliminary results from a recent, ongoing online evaluation survey among our recent students and alumni (n=235, link to survey sent via email) have shown that

- more than 99% of students would choose to apply to BMEP again,
- 83% found the program very or rather supportive for their career,
- 96% deemed it very or rather useful for their personal development, and
- 94% reported that it has improved their intercultural skills.

4. Discussion

Careful selection of students [7] in an international exchange program such as the BMEP is very important for success, but so is safeguarding them from insufficient supervision and 'scientific exploitation' by carefully choosing trustful mentors and combining them with equally trustful home mentors. The mentor-to-mentor concept has proven itself over more than 40 years now and has additionally enabled the establishment of a huge network of researchers and alumni, who support the program and are willing to let young

academics gain a deep insight into their research work and let them participate in excellent research.

While our evaluation survey has not been completed yet and does not aim to measure educational outcome such as exam results, we may conclude that most of the students are satisfied by the support that BMEP has provided to them. We aim to publish more detailed methods and results in a follow-up paper. In developing the program further for future cohorts and their expectations, e.g., by providing an Internet portal for electronic submissions and by fostering social media support groups, we are determined not to change the basic concept of the program. The reported success factors are based on personal experiences and individual feedback by our students and therefore may not be entirely generalizable, but nevertheless we considered both the concept and the perceived success factors as worth reporting for similar programs.

5. Conclusion

Particularly in the study of medicine, but not limited to this, there is often a lack of opportunities for an early start into an academic career and gaining research experience abroad. Programs such as BMEP provide this opportunity to motivated and excellent students, with a strong emphasis on mentoring.

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