
AC 2011-1887: THE PERFORMANCE OF GERMAN EXCHANGE STUDENTS IN THE U.S.A. - A LONGITUDINAL STUDY

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The Performance of German Exchange Students in the U.S.A. A Longitudinal Study

Abstract

The Milwaukee School of Engineering (MSOE) and the University of Applied Sciences Lübeck/ Germany (FHL) have a well-established, dual-accredited, bi-directional exchange program in Electrical Engineering that is completely integrated into the curricula of both institutions. The basic layout of this tuition-neutral exchange program is shown in Figure 1. MSOE and FHL students spend the first two years at their home institution. During the first half of the second year, the students express their desire to participate in the exchange program. After fulfilling all academic requirements, students from both universities spend their third (Junior) year together at FHL and their fourth (Senior) year together at MSOE. The full academic year abroad provides the best aspects of an immersion type program, but in the company of fellow students from one's home institution. All courses taken abroad are in the English language and fully transfer ensuring no delay of the students time to graduation. Upon successful participation students receive accredited undergraduate Electrical Engineering degrees from both institutions. Over 200 students have participated successfully in this award winning¹ program since its inception 16 years ago with a success rate exceeding 98%.

This paper is a longitudinal study of the academic performance of the German exchange students at MSOE before, while, and after participating in this exchange program. Specifically, it tracks the student's performance in a number of technical and non-technical categories and demonstrates the effects of the ongoing course and program-level improvement process implemented between MSOE and FHL.

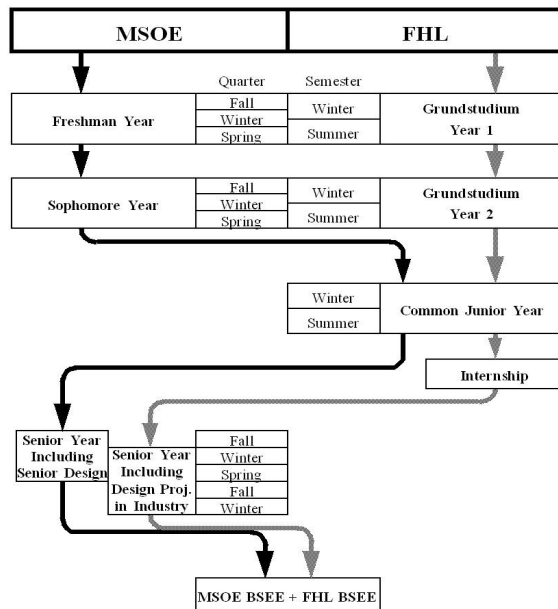


Figure 1 - Layout of the Exchange Program in Electrical Engineering

Participation

Ultimately, every exchange program is measured by the level of participation of students from both institutions. Success (or failure) of such a program depends on many individual factors. Informal data gathered over the last nine years (corresponding to app. 120 participating students) indicate, that the following factors played a major role in determining participation:

- Overwhelmingly positive feedback from past participants
- Dual-degree program without a delay in graduation, i. e. full transfer of all credits taken abroad
- Cultural immersion and horizon expansion for an entire academic year together with other students from the same home institution
- Added boost in employment opportunities
- Cost-neutral (with the exception of traveling while abroad)*

Participation also depends on total enrollment numbers, as the exchange students are a subset of the total student population. Figure 2 shows the student participation since the programs inception in 1994, clearly exhibiting widely varying numbers. Smoothing the data by using a floating 3-point average filter as shown in Figure 3 gives a more clearer trend. The data suggests that since 2003 FHL student participation is constantly increasing. This corresponds well with Freshmen enrollment numbers at the FHL² (and in general in Germany)³.

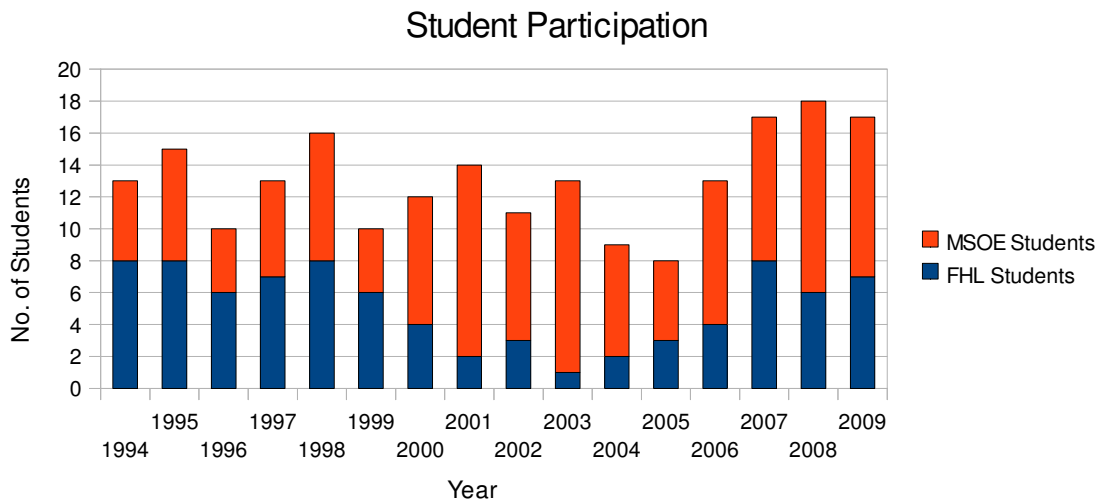


Figure 2 - Student Participation in the Exchange Program

*: Cost neutrality is a very subjective point. Almost all participants of both student populations (i. e. students from MSOE and FHL) report that the costs of living overseas are higher than at home - regardless of varying currency exchange rates. Official calculations including all tangible costs (but excluding travel while abroad) show that the total costs are very comparable. In addition, MSOE students can receive grants from an on-campus foundation covering the initial airline-ticket.

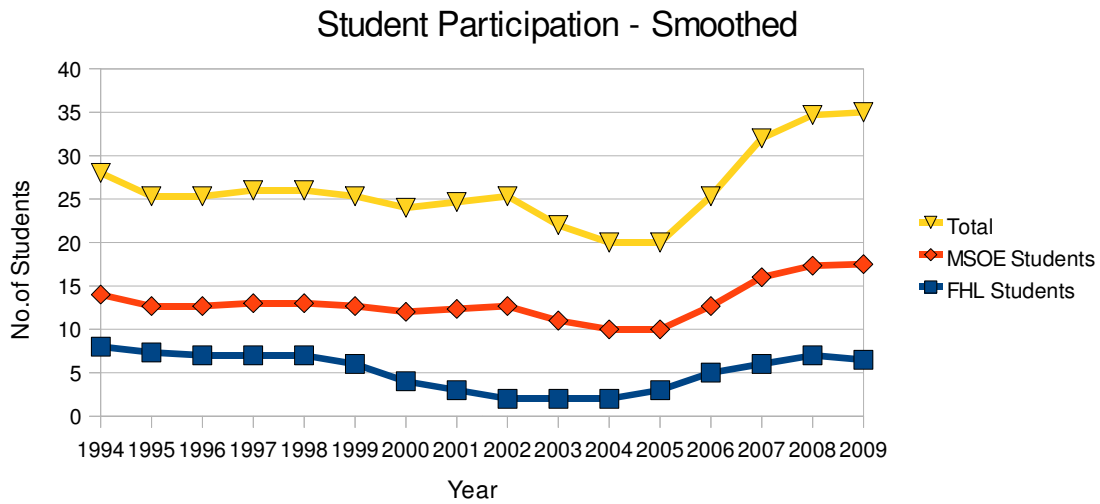


Figure 3 - Average Student Participation (smoothed data)

Grade Conversion

Grading scales and schemes differ considerably between MSOE and FHL. The grading scale at MSOE uses the typical U.S. grading scheme and is divided into 8 levels⁴ - A, AB, B, BC, C, CD, D, and F (arranged best to worst). In contrast, the grading scheme at FHL uses the mandated German grading and is divided into 13 levels⁵ - 1.0, 1.3, 1.7, 2.0, 2.3, 2.7, 3.0, 3.3, 3.7, 4.0, 4.3, 4.7, and 5.0 (arranged best to worst). The grading conversion chosen for the exchange program is shown in Figure 4. This conversion was chosen after extensive discussions between the faculty of both institutions and careful comparison of grade definitions.

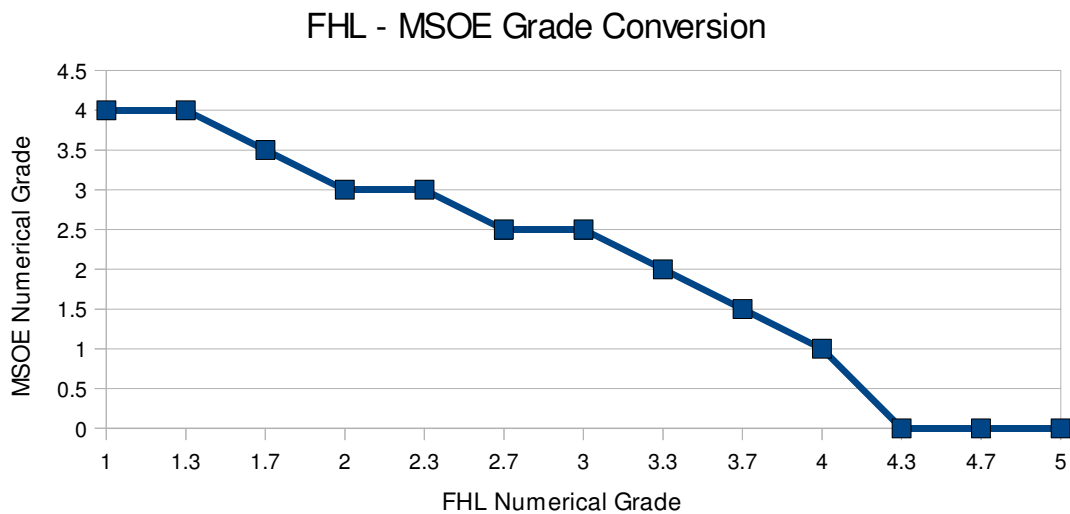


Figure 4 - Grade Conversion

Workload

Student workload at colleges in the U.S.A. usually are not officially published by the institutions - in general, a credit count is associated with a course, not directly relating to student workload. In stark contrast, since the Bologna agreement in 1999⁶ E.U. countries have settled on a unified credit transfer system ECTS⁷ indicating the total workload for a student in a given course. In order to compare total workload for the exchange students, MSOE (quarter) credits have been converted into total student workload using the published guidelines⁸. This can be seen in Figure 5, comparing student workload (in total workload hours) for both student populations.

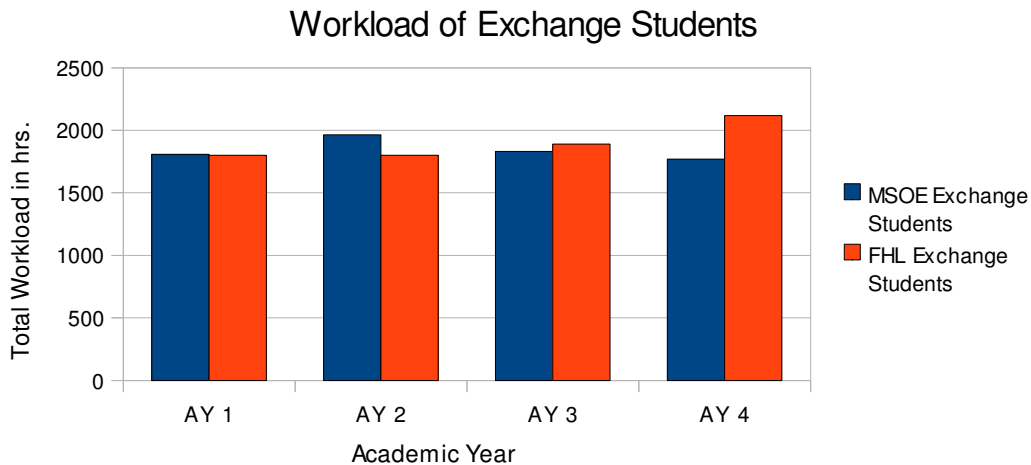


Figure 5 - Total Workload Hours for Exchange Students

Despite the different education systems of the U.S.A. and Germany and the different allocation of workload across the four academic years, total student workload differs by less than 3% as shown in Figure 6. It must be pointed out that the sharp increase in workload for the German exchange students in the fourth academic year is due to a much longer and more thorough preparation of the seniors for entering the workforce. In particular, the required capstone project for the FHL exchange students is approximately twice as long as the required capstone project for the MSOE exchange students.

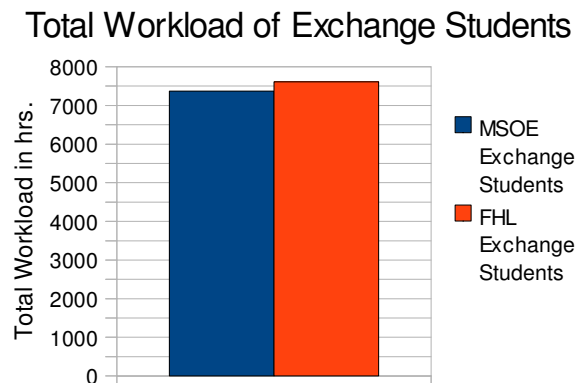


Figure 6 - Total Student Workload for Graduation

Overview of Academic Performance Data

The academic performance of the German exchange students has been collected since the programs inception in 1994, corresponding to 209 exchange students, 83 from FHL and 126 from MSOE. The performance data consists of course-level grade-book entries, Term GPA at FHL and MSOE, and Cumulative GPA at MSOE. The data is compared to the data of the MSOE exchange students, giving an indication of the preparedness and readiness of the FHL exchange students.

The Term GPA of the exchange students in the non-technical courses (i. e. courses in Humanities and Social Sciences) at FHL and MSOE has been compared and is shown in Figure 7. It can be clearly seen, that the preparation of the FHL students for non-technical courses at MSOE is outstanding, despite the fact that the German exchange students prior to participating in the exchange program have only one (!) non-technical course at FHL. By the end of the Senior year at MSOE, however, FHL exchange students outperform the MSOE exchange students in non-technical courses by almost one half of a grade (delta=0.49).

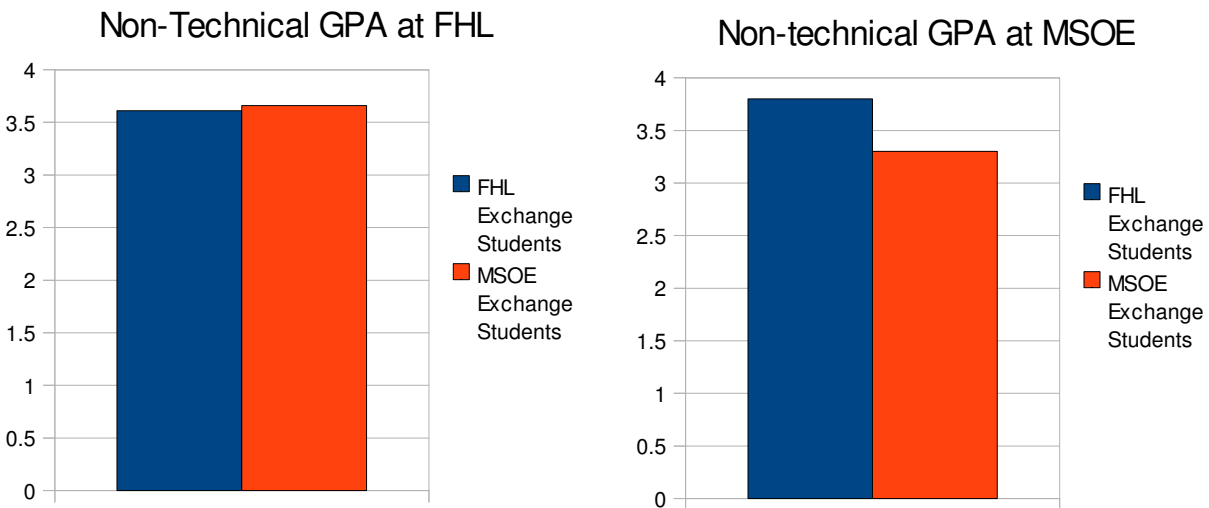


Figure 7 - Performance in Non-Technical Course at FHL and MSOE

The term GPA of the exchange students in the technical courses (i. e. courses in Electrical Engineering, Physics, Chemistry, and Computer Science) at FHL and MSOE has been compared and is shown in Figure 8. Again, it can be clearly seen that the preparation of the FHL exchange students is extremely good, since they outperform the MSOE exchange students in technical courses in the Senior year by almost one third of a grade (delta=0.31).

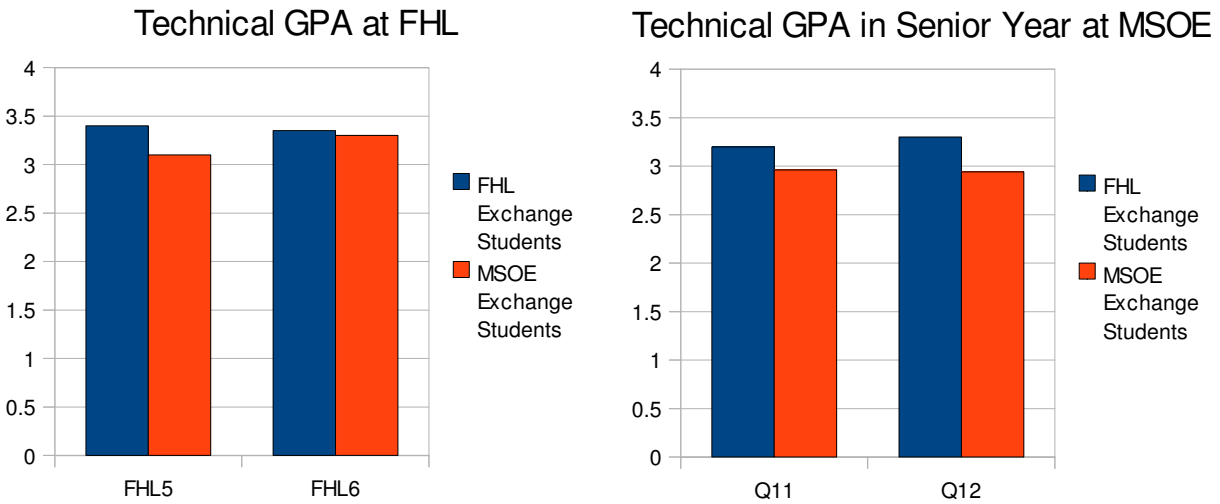


Figure 8 - Performance in Technical Courses at FHL and MSOE

The longitudinal data has been gathered since the programs inception in 1994 and is shown in Figure 9, showing the Non-Technical GPA and Technical GPA of the German exchange students at MSOE over the last 16 years. It clearly shows a "learning phase" in this exchange program lasting for approximately five to six years, where the instructors and course outcomes at FHL adapted to academic requirements set forth by the exchange program. Since the turn of the century however, student academic performance is relatively constant.

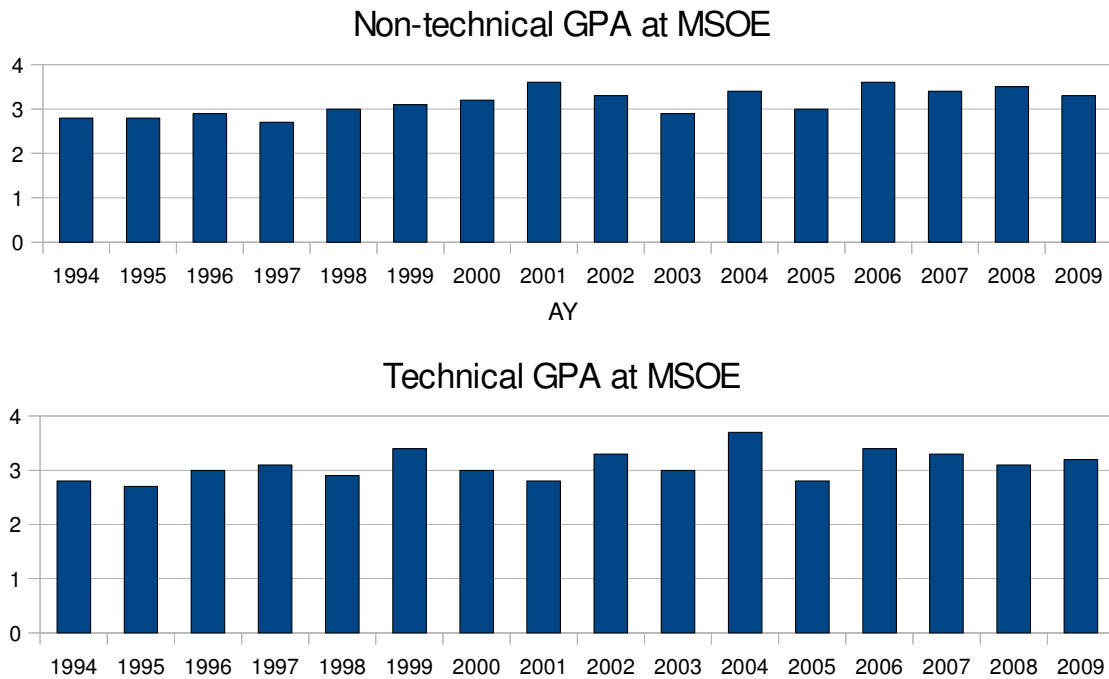


Figure 9 - Non-technical and technical GPA at MSOE

Conclusion

The Milwaukee School of Engineering and the Fachhochschule Luebeck/Germany have developed and implemented a student exchange program that is completely integrated into the curricula of both institutions. The academic performance of the the FHL exchange students has been presented and the data analyzed. The data suggests, that the preparation of the FHL exchange students for the overseas studies at MSOE is extremely good, with the German exchange students outperforming their American counterparts in technical and non-technical courses by a significant margin.

References

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