Did the Bologna Process contribute to improving international students' success rates in Germany's HEIs?

Twenty years of success rates in Germany: how the Bologna Process impacts on the success rates of International and German students – the case of Germany's bachelor and diplom mechanical engineers

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Abstract

Low success rates are a thorn in the side of any Higher Education Institute (HEI). With increasing aspirations of attracting international students to Germany (HRK 2020), the international students' success rates are worthy of a review. For it reflects on how internationalisation processes, such as the Bologna Process, impact on success rates and whether the changing structures attract international students. We used the German administrative data, covering twenty years, to create this cross-cohort analysis of student success rates. By creating a common finishing point-in-time, the combined success rates of diplom and bachelor students in mechanical engineering show that the synchronised success rates for the increasing number of international students are not just comparable, but better than those of the German students.

Keywords: *International students - success rates - Bologna Process.*

1. Introduction

Reforming the higher education system in accordance with international processes such as the Bologna Process (BP) in 48 countries (EHEA, 2020) is no easy task. The success of the process depends upon how we define success, how high or low we set the bar, and what aspects of the BP we are considering. The success of the reform in Germany's higher education is at least two-fold. We can argue that the BP as a form of internationalisation of higher education within the global market (Wit, 2011) has been a success, where internationalisation includes the structural transformation, for example, Germany replacing its diplom[1] with the bachelor degree programmes. This transformation also incorporated a mechanism to reduce study time. This was a success because it reduced the 'regular'[2] study time from 10 semesters in a university or technical university diplom programme to a six/seven-semester[3] bachelor depending on the location, institution, field of study etc. Second, through the introduction of the bachelor programmes, the signatories achieved "mutual recognition" (EHEA, 2020) of higher education qualifications. This facilitates mobility and migration of not just international students, but also potential labour (King & Raghuram, 2012). However, understanding internationalisation is not without its criticisms, (Wit, 2011) for the demanding strictures need to include the approaches of HEIs and their environments (Knight, 2008). Thus, all the more reason to review two decades of success rates of those international students that choose to migrate to study in Germany's HEIs as a part of the process of internationalisation.

Analysing the international students' success rates in comparison to the Germans students' success rates is important also because we see how the political intervention (Lith, 2005) changed the space of German higher education for both German and international students. By reviewing this growing population, the comparable success rates can teach us about the strengths and weaknesses of processes, programmes, and approaches. Thereby portraying the impact of policies, and the overarching reach that the HEIs programmes have.

The migratory movement of the international students tells us about the socio-economy and the push and pull factors of sending and receiving countries (Grözinger 2011). Their success rates also demand that we consider the theoretical understandings of path dependency (Perkins & Neumayer, 2014). Thus, this paper will identify the comparable success rates of the international and nationally educated students, revealing both comparisons and differences. Comparable results amongst the international and German students imply

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[1] Prior to the Bologna Process, instead of the bachelor, the universities and technical universities provided a five-year diplom, and universities of applied sciences awarded the four-year "Diplom FH".

[2] Regular refers to the given time but not the taken time.

[3] The BSc programmes in Mechanical Engineering are six- or seven- semester duration, there may be exceptions with a longer regular study time, and sometimes the study duration changes.

equality of opportunity is functioning. However, identifiable differences based on citizenship imply that the Bologna Process is not having the desired effect.

2. Literature reviewed

Being an attractive location for international students has many advantages, for both HEI, student and environment alike. The United States is often considered an esteemed location for international students (Cantwell, 2015). Despite the US's claim as "leading destination" (Thomas & Inkpen, 2017, S. 791) for international students this recognition is not exclusive to the US. Australia, too, recognises the added value that the international students make to their environment whilst in Australia because they contribute to the domestically educated in Australia and to much more through the daily living expenses that support local economies (Mazzarol, 1998).

The importance of international students per se on a societal level is such that the World Bank analyses areas of research worth considering, also because of the unknown potentials of international students and the complexities of their presence in contemporary society from a fiscal and migratory perspective (Chellaraj, 2019). Migration, both push/pull (Grözinger 2011, King 2011, Massey et al 2005) have been researched from different perspectives of how push / pull in part explains the international students, and the variety of migration theories that evolved (Massey, et al., 2005). The impact of the sending countries' demographical development, and how their younger cohorts are developing, was identified as a contributory explanation to understanding where and why certain nationalities are likely to continue sending students, and also that the countries growing GDP relative to growth in younger cohorts could reduce the outbound student migration (Thomas & Inkpen, 2017).

Various definitions contribute to various understandings and the methods taken to analyse whether we are talking about student dropout, retention, graduation or success rates (Wolf-Wendel, Ward, & Kinzie, 2009). For example, in Germany, low success rates in bachelor degrees begs the question why are the rates low. Studies have shown the success rates in mechanical engineering are improving (Heublein, Richter, & Schmelzer, 2014) and variable (Klöpping, et al., 2017). The acatech Study on success rates focused on a group including universities and technical universities, their sample of HEIs amounted to a group that accounts for almost 75% of STEM students and their analysis which showed the variability of discontinued courses initially used internal data (Klöpping, et al., 2017). Therefore, the continually ongoing internationalisation process reinforces the need to constantly review the structural and spatial impact of these processes on the HEIs.

3. Methods

This analysis of student success rates uses Germany's administrative data. Each of Germany's 16 federal states has its own ministry for education. Since 1995, all student and examination data are electronically recorded according to a master questionnaire. Each winter registration includes all students registered, with their respective semester in their respective course and HEI[4], thus each case is a registration. The examination data includes the final examination with the grade of that exam for each HEI, therefore exam data are cases of final exams.

We used all student registrations from 1995 up to 2015 and all examinations from 1996 up to 2015 (at the time of writing)[5]. Each HEI delivers its data to the German research centre (FDZ)[6]. There are various data centres in Germany, each one is responsible for a different field. The centre responsible for Higher Education is in Munich, therefore all data are stored in Munich and then released to the data centre where we request to work[7]. In the research centre, we analyse the datasets, and there is one dataset per semester for both students and examinations. The student datasets for one winter semester contain anywhere between 1,7 and 2,9 million registrations in Germany. Because of the data protection laws and because of the sheer size and limited capacities of the working stations we worked with smaller datasets[8].

The datasets (student and exam) include the year of reporting, federal state, HEI, the numbers of semesters in total in Germany, the number of semesters for this particular programme, the year of birth, the month of birth, gender, type of matriculation qualification (MQ), year of right to matriculation, place of matriculation[9]. The examination data contains the final grade, year and month of the exam, as is the programme examined included. Both student and exam datasets inclusion of place of matriculation and students' citizenship mean that we could create a dummy variable with four categories identifying if the student is German with a German right to matriculate (GG); non-German with a German right to matriculation (FG); German with a non-German right to matriculation (GF) or the fourth group which is foreign with a foreign right to matriculation (FF). This separation allows for a comparison between the German students (GG) and the internationals (FF) and a differentiation between the foreign residents (FG) and the international students (FF) (McGrory, 2020)[10]. However, it

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[4] A change in laws in 2017 means that summer registrations will also be recorded https://www.destatis.de/DE/Methoden/Rechtsgrundlagen/Statistikbereiche/Inhalte/505_HStatG.pdf?__blob=publicationFile

[5] The project began in 2017, therefore the initial purchase was for data up to the winter semester of 2015, since then more recent data (exam & student) have become available and will be leased in order to update our results https://www.forschungsdatenzentrum.de/de/bildung/pruefungen https://www.forschungsdatenzentrum.de/de/bildung/studenten

[6] Forschungsdatenzentrum.

[7] Kiel provides two working stations where we were allowed to work.

[8] We used all cases, this was reduced to the fulfillment criteria explained in the methods section, see also Bandorski et al 2019.

9 Place of matriculation if in Germany is town or district, if not in Germany then the country code is recorded.

[10] This work is part of ongoing research, and also in part of published work (McGrory, 2020)

must be taken into consideration that both the student and examination data record only one citizenship. Once neutralisation occurs in Germany, German citizenship will primarily be recorded.

A cross-cohort analysis provided a reliable method (Bandoski et al, 2019). The sample was based on those full-time students majoring only in the field of mechanical engineering with presence-based courses for the six-semester bachelor and the 10-semester diplom, and these formed the synthetic variable. This cohort merges the diplom and bachelor so their completion according to the regular study time is the common point, the respective starting point is the winter semester either six or 10 semesters prior to the common point in time of the examination. However, we extended the finishing time for our synthetic variable so that the completed time includes a total of four extra semesters. All the success rates in table one are based on the 14 semesters for the diplom or 10 semesters for the bachelor to create a total study time (McGrory, 2020). We researched the duration of the respective programmes because many bachelor programmes in mechanical engineering have six or seven semesters for their regular study time. The sample HEIs provided are from what is also known as the TU9 group (Klöpping, et al., 2017). Although the *acatech Studie* did not reveal the results per HEI's name, they listed the HEIs that were included.

To date, in our datasets we have 13 cohorts, beginning with the winter semester diplom in 1995/96, and the bachelor winter semester in 1997/98. Each cohort starts at two different points in time, point one for the diplom and two years later for the bachelor. This method is continued and is carried out throughout for all 13 cohorts, with the final cohort beginning in the winter semester of 2007/08 for the diplom and 2009/10 for the bachelor. By analysing the six-semester degree programmes according to the acatech study (Klöpping, et al., 2017) our sample includes the following HEIs: TU Darmstadt, TU Braunschweig, FAU Nürnberg-Erlangen, LU Hannover, KIT, TU München, Universität Stuttgart. We grouped the HEIs because the numbers would otherwise be too small for release, but it shows that this method can be further applied to identify individual HEIs' success rates (Bandorski et al, 2019).

4. Result

Table one has the absolute (abs) numbers of students starting in the synthetic cohort. The first cohort (c1) shows the absolute number of students starting in the diplom in 1995/96, were no bachelor starters for these HEIs in 1997/1998. It shows the percentage of students who completed their degree in the total study time. The synthetic success rates are for the diplom and bachelor as described in the methods section, the numbers of starters in the bachelor increases over time. The success rates in the synthetic variable are based on a total of 14 semesters for the diplom or the 10 semesters for the bachelor. What we do see is that, overall, the synthetic variable (in the earlier years just the diplom) shows that the international

students present better success rates than their German colleagues throughout the table. The smaller FF group is smaller throughout all cohorts. With 48% success rates for the international students in comparison to the 40% for the national students in C1, the international students' success rates are better than the rates produced by the German group. The low success rates for the FG students is very disconcerting, where their success rates are 24%. If we look at the bachelor success rates and then the respective (cohort) success rates for the synthetic variable a different picture emerges.

Table 1. Cohort 1,3,5,7,9,11,12 & 13 – Synthethic beginners and Synthetic and Bachelor success rates in the total study time (Source: FDZ, own calculations; McGrory, 2020).

Cohorts Dip/Bachelor	Group	Synth. Cohort - 1st Sem	Syn Cohort % Passed	BSc % Passed
1995/97 – c1	GG	1251	40,0	
1995/97	FG	74	24,3	
1995/97	FF	151	47,7	
1997/99 – c3	GG	1578	39,3	
1997/99	FG	89	18,0	
1997/99	FF	120	90,0	53,3
1999/01 – c5	GG	1759	47,1	
1999/01	FG	89	31,5	
1999/01	FF	185	67,0	54,5
2001/03 – c7	GG	2429	37,8	44,4
2001/03	FG	98	21,4	
2001/03	FF	357	47,6	16,0
2003/05 – c9	GG	3581	32,5	16,4
2003/05	FG	166	19,9	10,9
2003/05	FF	393	37,4	8,0
2005/07 – c11	GG	4241	40,4	33,2
2005/07	FG	168	27,4	28,6
2005/07	FF	301	54,2	22,2
2006/08 – c12	GG	6493	48,7	47,4
2006/08	FG	270	28,5	31,7
2006/08	FF	333	57,1	32,1
2007/09 – c13	GG	6818	55,6	55,8
2007/09	FG	325	33,2	31,7
2007/09	FF	357	64,1	36,2

The success rates with the synthetic variable imply that the international students (FF) have comparable success rates to the German students (GG). For example in c13, the success rates for FF students in the synthetic variable are 64% in comparison to the GG students with 56%, however, if we take a look at the respective bachelor success rates of 36% for the FFs in comparison to 56% for the GG students, then the picture tells us that bachelor success rates for the GG students are far better than the FF students. But here the success rates for the diplom[11] must be better for the FFs than the GG students[12]. I assume that the FF students begin in the bachelor and switch to the more "German" diplom. The synthetic variable also clearly shows the miserable success rates for the FG group- and not just in one cohort but consistently throughout the table. This groups' success rates in the bachelor from C11-C13 is comparable in both the synthetic and bachelor programmes, which possibly means there is little movement from one programme to the other, and from C9-C11 their results in the bachelor rates are better than those of the FF students but worse than their GG colleagues. Equality of opportunity should imply that there is no real difference in the results amongst any of the groups regardless of where they received their right to matriculation.

5. Conclusion

The international students in Germany's bachelor and diplom mechanical engineering degrees were both used to assess the success rates in the given HEIs which were universities and technical universities over twenty years. This took into account the Bologna Process and its' transition period from diplom to bachelor. The results of the synthetic variable showed that the success rates were better for international students than their German colleagues. However, the success rates for the bachelor alone (a Bologna Process product) are comparably low, but the synchronised variable which includes the diplom are higher. This implies that the given sample showed that the diplom remained attractive to international students. It is questionable if the political pressure to create "mutual recognition" (HRK, 2020) meets the aspirations of the students. It also emerged, through differentiating the FG students from the FF students, that the FG students have the lowest success rates in the synthetic variable according to this cross-cohort analysis with the administrative data in Germany. If higher education is supposed to deliver equality of opportunity, then realistically we need to continually pose the question: are our HEIs providing for equality of opportunity?

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11 If however, the international students enter into the bachelor and switch to the diplom, it would imply that a) the international students were attracted to the diplom b) the question remains unanwered but worth posing as to whether the diplom is considered the key to employment in Germany or c) the German diplom was desired by the sending country or d) is the diplom considered an important step towards integration into Germany – linguistically, culturally, socially and economically.

12 Further analysis will be carried out statistical testing, –at the time of writing accessing the data centre is prohibited due to the Corona Virus, see also McGrory 2020

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