

The Future of Studying in Germany

**FOR INTERNATIONAL
STUDENTS IN THE LIGHT
OF COVID-19**



**STEINBEIS INSTITUTE FOR
GLOBAL ENTREPRENEURSHIP
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Deutsche Gesellschaft
internationaler Studierender



Whitepaper

The Future of Studying in Germany for international students in the Lights of Covid-19

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Abstract

The present study is concerned with assessing the qualities the *university of the future* might need in order to be sustainable. Therefore, the paper builds on literature in regards to the internationalization of universities and education with a special focus on German universities, whose on-going internationalization process since the 1980s is described. While the generally increasing amount of international students and international staff members is highlighted alongside the generally positive perception of German universities, a number of challenges is named that can prevent international study experiences. In these regards, special considerations are given to the challenges arising from the COVID-19 pandemic and its influence on the study and learning experiences in an international context. Additionally, recent research on changing expectations for universities is presented, wherein new approaches like the enrichment of studies through entrepreneurial aspects are discussed.

Based on this initial literature review an empirical study following a quantitative approach was conducted. Using standardized scales, the perception of German universities through international students in regards to various aspects of COVID-19 induced changes and challenges, in regards to the aforementioned enrichment programs and in regards to the general perception of the German university system, was assessed. The main hypotheses of this study could be confirmed – German universities are perceived in a generally favorable light by international students, although the COVID-19 crisis impacted study plans and study experiences. Enrichment programs that would see an introduction to entrepreneurial aspects in engineering studies and vice versa are also shown to be a valuable addition to the study experience. This goes, as the final discussion of the paper explains, in alignment with various proposals in regards to the *university of the future*, which despite the challenges arising from the pandemic should see a strong focus on hybrid forms of learning, enrichment programs and an on-going internationalization of students and staff alike.

This Whitepaper has been written by Alexander Ruthemeier as inauguration paper in his role as Founding Director of the Steinbeis Institute for Global Entrepreneurship and Innovation and Managing Director of DeGiS – Deutsche Gesellschaft internationaler Studierender gGmbH (German Association for international Students). The study has been conducted in close collaboration with Expatrio Global Services GmbH. Special gratitude is given to Prof. Dr. Marc Drüner of Steinbeis School of Management and Innovation GmbH for his support and continuous feedback.

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1 Introduction – International Studies in Germany

Universities are not only places of research, knowledge and teaching, but also pose an economic impact on their regions and countries (Kotosz, Gaunard-Anderson & Lukovics, 2018; Valero & Van Reenen, 2019). As Glückler, Panitz and Wuttke (2018) explain, on the example of Germany, universities influence the economy not only by providing job opportunities and by fostering the local community with additional employment options in the vicinity of universities, but also by enabling the (future) workforce and benefiting the country itself thereby. German universities are increasingly internationalized, a development that historically stems back to “the post-1945 belief that only a Germany that was firmly anchored in Europe and the world could be internationally accepted and economically successful” (Wahlers, 2018, p. 9). Especially since the 1980s, a strong trend towards this internationalization can be observed, strongly fueled by globalization itself and the rise of the European Union as uniting power within Europe. Today, however, international students in Germany stem mostly from China (around 40.000) and India (around 20.000) with a combined number of over 60.000 students, as data from the German statistics organization *Statistisches Bundesamt* (cited by Statista.com, 2020) shows. These two countries are followed by Syria (13.000), Austria (11.500) and Russia with 10.500 students. Additionally, to this high number of international students, the increasing globalization and internationalization of universities of course also brings international lecturers and other staff members (DAAD, 2020a). These numbers, the report shows, are constantly rising, since the year 2012 as well for general staff as for professors. Staff members typically migrate to Germany from Italy, China, India, Austria and the USA (DAAD, 2020a). For the four most renowned German universities, The German Academic Exchange Service (Deutscher Akademischer Austauschdienst, DAAD, 2020a) reports even higher numbers of foreign staff members and thus, a higher level of internationalization. This increasing internationalization, in turn, also leads to additional economic impacts, as López, Fernandez and Incera (2016) point out. International students, it is argued, can benefit the local economy and thus, contribute to the positive economic impact of universities in general (Nestorenko, 2016).

The DAAD (2020b) proposes that, while these numbers are a positive sign, within the next five years an even stronger internationalization in Germany should be achieved as part of the so called *Strategy 2025*. At the same time, a report presented by Bertelsmann Stiftung (2015) shows, that internationalization of German universities – while increasing permanently – is still in need of further development.

The general internationalization of universities – not only German ones – is driven not only by globalization itself but also partially by the chances brought along by the increased digitalization: Information is available on an increasingly international level and cross-border communication becomes easier with the rise of information technologies and social networks. As also holds true for the general economic development, the combination of globalization and digitalization (which in turn depend partially on each other) brought changes also for universities, who nowadays, as authors such as Horta (2009) explain, are shaped increasingly by a high level of internationalization, both on a student and staff level (Jones, 2013). International collaborations for research projects are also increasingly used, as various funding programs of the European Union also highlight (Hirv, 2018). Also, exchange programs such as Erasmus and research mobility networks such as Euraxess enable students with an easier opportunity to gather experiences abroad, thus also leading to a stronger internationalization (Juvan & Lesjak, 2011).

In general, the internationalization of universities goes along with a language shift, authors such as Gonzalez (2017) argue. Among the main challenges of studying abroad is a possible language difference. In order to address this challenge, a shift towards the general usage of the English language as *lingua franca* at universities can be observed. This allows a wider majority of students to collaborate and is seen as one of the key criteria for the successful internationalization of universities (Adams & Gurney, 2016; Melin, 1999). This is also pointed out by Geibel and Manickam (2016), especially with regard to international students. Here, Germany could only insufficiently access a pool of appropriately motivated and trained specialists from the international arena, which – according to the authors – could pose a long-term challenge for the location and the ecosystem. One of the reasons for this is that many German universities teach in German for a great part of their study offerings, which is a challenge for international students and thus discourages them from studying in Germany. Also, challenges arise for international students in regards to funding opportunities and legal aspects of migration (Tran & Hoang, 2020). The COVID-19 crisis, recent media reports indicate, seems to complicate the situation further, as it affects both students' mobility (with many of them applying comparatively late for visa or exchange programs) and universities' ability to perform (Süddeutsche Zeitung, 2020). Further challenges derived from recent media reports include missing access to funding opportunities that would allow for easier financing of the studies (among others student loans and job opportunities for international students). Students therefore have to mainly rely on opportunities presented to them from their own

countries, although due to the COVID-19 situation the access to funding opportunities to foreign students was opened partially (BMBF, 2020). In regards to legal challenges that international students might be facing, especially for those stemming from countries outside the European Union, the recognition of existing academic grades (or prior academic achievements in general) seems to be of high relevance. The association uni-assist (Uni Hamburg, 2020), which was established by German universities to process applications from international students, seems to be a helpful resource here, but also comes with challenges, such as a work-overload during peak season resulting in long processing times and employee strikes (Süddeutsche Zeitung, 2020). These and comparable challenges can be especially threatening to international students, as a report presented by SVR Migration (2017a) shows.

However, it seems clear that students seeking for international study experiences are not only thriving for the academic exposure to varying points of view and for an increased learning opportunity but also for social and cultural benefits arising from time spent abroad in a new, culturally diverse environment (Elturki, Liu, Hjetness & Hellmann, 2019; Sherry, Bhat, Beaver & Ling, 2004; Vedder, 2006). This assumption builds one of the core foundations of this research paper: the Covid-19 crisis brought with it – among a multitude of other challenges and risk factors – a strong shift towards online or hybrid study programs. Hybrid study programs – that combine online and offline aspects of teaching and studying within one program – offer new possibilities, while also posing various challenges to all actors involved (Goodyear, 2020)

Like in other workplaces, *work from home* or rather *study from home* programs were induced all over the world, with *Zoom classes* taking over the majority of teaching experiences. While in general it is argued, that digitalization of learning opportunities can lead to a stronger internationalization, it remains unclear, if this is perceived as such by students in general. Also, it seems unclear, whether this focus on distance learning in general is seen as an advantage or a disadvantage – especially as the development goes along with a set of other restrictions in regards to mobility (DAAD, 2020d; 2020e). As mentioned above, students seek not only educational but also social experiences from studying abroad in an international setting, the focus on mostly digital experiences might lead to a neglect of these aspects (Shenoy, Mahendra & Vijay, 2020). The digital experience seems to differ in a wide variety of aspects from the classical university experience, both on an educational and a social level, as authors such as Rapanta, Botturi, Goodyear, Guardia and Koole (2020) further point out. This is one of the key propositions of the present study that aims to analyze the perception of

international study experiences at the midst of the COVID-19 crisis. As mentioned above, it is assumed that the COVID-19 crisis brought with it a disruption of academic life and life circumstances. Within the present study, however, it shall be analyzed, how these disruptions influenced the perception of German universities. In general, the study furthermore builds on the notion, that German universities – that are at the focus of the present study – are (still) perceived by national and international students alike as positive. For the present study, the focus lays on international students that either already do live and study in Germany, thus experiencing the German university system from their own practice, or those still living abroad, thus judging and assessing it based on their expectations. Further, the study aims at fostering understanding of how the COVID-19 induced changes to study programs and subsequently study experiences are perceived by students and which counter-measures to those consequences can be found useful. Especially, the focus therein shall be shifted on hybrid forms of learning: As at the time of data collection in August and September of 2020, the pandemic situation still implied a need for (mostly) online teaching, the search for formats that gather both the academic progress and social well-being of students seems crucial. Therefore, various types of hybrid or mixed models shall be presented and assessed, ranging from hybrid models that offer both on- and offline aspects to models that allow students to start with an online setting and switch later-on to offline studies. Scientific literature in regards to the options various learning settings offer explains that the distinction between pure online and pure offline models of learning and teaching would be an overly simplified one, with various models combining on- and offline contents and approaches (Mumford & Dikilitaş, 2020). Mixed and hybrid models can therefore consist of various approaches, such as courses allowing both for in-person and online learning or for study programs combining on- and offline courses. However, the uncertainty of the future developments in regards to the COVID-19 crisis raises the question, which models will offer the biggest benefits (Cochrane et al., 2020). It seems clear, however, that hybrid models of learning that combine on- and offline aspects seem to be viewed in a positive way from an educational perspective (Reasons, Valaderes & Slavkin, 2005).

2 The University of the Future

The study is therefore strongly focused on *the future of higher education*: While the COVID-19 crisis might represent a strong disruption in the way teaching is communicated and conducted, a general shift towards a more future-oriented teaching seems observable, as Kosslyn and Nelson (2017) explain. The authors therein argue that there is a rising need for (thought) leaders who are able to combine not only factual knowledge and general skills but also managerial and entrepreneurial excellence, which is also strongly needed for successful entrepreneurs of the future (Tsolakidis, Mylonas & Petridou, 2020). The university of the future, Kosslyn and Nelson (2017) argue further, is therefore shaped by the enrichment of classical programs for example with entrepreneurial or creative approaches. The need for adapted and adequate study programs and opportunities is also highlighted by findings such as the ones presented by DeVaney, Shimshon, Rascoff and Maggioncalda (2020), who were able to show that even non-university suppliers of education such as *Coursera* who offer additional trainings and knowledge sources are gaining traction drastically: In regards to the situation in May 2020 – at the midst of a period known now as *lockdown* – the authors explain that within “the last 30 days, there were 10.3 million enrollments in courses on Coursera, up 644% from the same period last year” (DeVaney et al., 2020).

The case of Minerva, a university described to be a future thought leader at the crossroads of modern higher education, shows that such programs cannot only be implemented but can even be implemented in a sustainable way. Therefore, one of the core problems – according to Kosslyn and Nelson (2017, p. 6) can and has to be addressed: “higher education is not fulfilling its promise: students are leaving college woefully unprepared for life after graduation. They do not receive or develop the cognitive tools they need to succeed personally and professionally in a highly complex world.”

Addressing this and connected challenges require not only a new approach to combining multi-disciplinary studies (Fost, 2017), new ways of understanding how learning happens based on contemporary educational research (Kosslyn, Goldberg & Cannon, 2017) but also the creation of what can only be described as a new institution: The structure of a modern 21st century university needs to follow the visions of our times (Ross & Goldberg, 2017) and should be based not on historically grown university structures but on the principles of modern leadership and management in a strongly globalized and digitalized world (Wang & Krispil, 2017). This goes in alignment with other modernization processes in the area of

public management (Anderson, 2017; Dal Molin, Turri & Agasisti, 2017), where authors such as Hyndman and Lapsey (2016) argue that in the contemporary setting even governmental authorities and organizations have to follow modern management approaches in order to be sustainable and strong partners to the general public. These approaches are usually summarized under the terminus *new public management*: The present paper – in strong alignment with the work of Kosslyn and Nelson (2017) – argues and tries to prove empirically that a *new management* for *new universities* in *new educational environments* is necessary to thrive. Such approaches, the author argues, will benefit not only universities, but also the students and subsequently the general public, when graduates emerge who do not only possess the skills and knowledge to tackle the challenges of our time, but graduates who also have the entrepreneurial mindset and skillset to know how to put their skills and knowledge to good use. This is further highlighted by Osland, Li, Petrone and Mendenhall (2018) who explain that a strong future-orientation and a high level of practice-oriented content seems to be a crucial factor for designing successful and sustainable study programs.

However, the present of universities does not always seem to comply with these propositions, as a study on barriers of universities shows (SVR Migration, 2015). Universities, the study highlights, are in many areas not yet up to speed to enable the most talents to the best possible education, as a gaze towards the economic situation of students and universities alike implies. Also, (German) universities in many cases do not seem to understand themselves not only as enablers of education, but also as enablers of business success, making use of extensive alumni networks like US American or Canadian universities do. In order to bring universities closer to what Kosslyn and Nelson (2017) describe as the future of universities, deep-rooted changes seem necessary, as was explained above with regards to the findings of DeVaney et al. (2020). The practical consequences of this not completely satisfactory situation at German universities – especially for international students – is highlighted by comparatively high drop-out rates, ranging between 29% in Master's studies and 45% in Bachelor's programs (Heublein & Schmelzer, 2018). A study conducted by DAAD (2018) shows that in general there seems to be a strong discrepancy between the expectations and the actual reality of studying in Germany. This is also highlighted by results indicating problems in the transitioning period between university education and actual job performance (Stifterverband, 2017). Also, German universities and higher education institutions in general are described therein as varying strongly, thus making generalized statements about the state of support

international students can be difficult to achieve. However, recent reports indicate, that Germany still is considered to be among the most popular places for international students, who are enabled with a lot of business opportunities following their studies in Germany (SVR Migration, 2017b)

However, the role of universities as supporters and drivers of change cannot be overestimated, research such as the one by Moore (2020) indicates: With more challenges arising within the world – ranging from various crises, economic developments, faster paced changes and the environmental decline – universities are portrayed to not only be suppliers of knowledge, but also suppliers of ways to foster entrepreneurial and leadership skills, that will be much needed. Cawood, Roche, Ong, Sharma, Mulder and Jones (2018) argue in these regards that universities of course have to adapt to these strong disruptions and changes. However, they also argue that universities are not only influenced by these developments, but can – if they actively seek to do so – take a leading role in shaping the world's reaction to the upcoming developments.

The developments arising from the COVID-19 crisis and its consequences on the educational sector, however, open up a wide variety of additional research questions that need to be addressed in the future: In these regards the topic of the digitalization in the light of the crisis seems relevant just as much as the changing expectations in regards to study experiences. The present work, as the following sections will show, presents a preliminary approach to answering some of the questions arising within this range of topic, however, new topics are opened up by the research itself.

3 Methodology

3.1 Framework and Research Design

The present research is exploratory in nature – using a quantitative approach it aimed to foster understanding of the overall perception of German universities in an international context with a special focus on the challenges arising from the COVID-19. Given the novelty of the situation and the subsequent challenges (and opportunities) arising for universities in the context of internationalization, such an exploratory approach was chosen. Based on the theoretical findings and proposals presented above, the present study seeks to answer a set of hypotheses, regarding both the future and the present of German universities in the context of internationalization. While the present study is aiming to assess initial propositions described throughout the paper using data from a substantial sample, it still needs to be clarified that these results mostly aim at fostering general understanding of the complex topic and to allow further research to answer the questions arising here with higher levels of validity. This analysis therefore opens the door for more stringent and reliable research.

The first hypothesis that guided this study regarded the perception of German universities in comparison to other countries' universities: It was assumed that German universities are well perceived both by local and by international students.

The second hypothesis aimed more closely at the future of universities and of learning: It was proposed that enrichment programs – for example adding entrepreneurial content to MINT or engineering studies – should be perceived as a positive development by students.

The third hypotheses aimed at fostering understanding of the impact of the COVID-19 crisis: It was assumed, that study experiences of both international students still living abroad and those already living in Germany are affected by the crisis and the countermeasures set by universities, however, the challenges experienced by the two groups should differ from each other.

Lastly, following this assumption, it was further proposed, that various new hybrid learning formats should be perceived as positive answers to the crisis, thus being perceived as ways to foster the experience of learning and its outcome.

3.2 Measures

Given the exploratory nature of this work that mostly aimed at fostering general understanding of the above-mentioned research problem, the present study did not make use of standardized and pre-evaluated measurements but was based around a single-item approach. Single items were used for assessing the relevant concepts of this study: The general perception of German universities (in comparison to those in other areas of the world), the assessment of hybrid-learning models and of enrichment programs, and the perception of how the COVID-19 crisis changed the study experience overall. Where feasible a 10-point rating scale was used with the assumption that equidistance of answering options should be given, thus allowing for parametric analyses of the data.

3.3 Sample

The sample was acquired from August to September 2020 from customers of Expatrio Global Services GmbH and members of DeGiS – Deutsche Gesellschaft internationaler Studierender gGmbH and consisted of international students stemming from outside the European Union.

Table 1. Age distribution (own data)

Age-Group	Frequency
16-20	141
21-24	573
25-30	466
31-35	113
36+	39

Overall, a total of $n = 1332$ students participated in the present study, with a majority of them being either Bachelor or Master students (see table 2) and being between 21 and 30 years of age (see table 1). A total of $n = 583$ students already live within Germany, whereas the remaining $n = 749$ international students live currently in other countries (with India, Mexico and China being the most notable ones, see Appendix A). The latter group of students living currently in other countries however can be described as a group that already has an admission for a German university and is at the time of participating in the survey undergoing the visa process allowing them to migrate to Germany for the next upcoming academic semester. However, the bias of the sample only consisting of international students is

addressed within the limitation section of this paper – generalizations can only be made towards the population of international students in general.

Table 2. Types of Study (own data)

Study Level	Frequenc y
Bachelor	678
Languag e student	44
Master	541
Other	50
PhD	19

4 Results

4.1 Descriptive Results

This section depicts the relevant psychometric information of the variables used for later analyses. This depiction aims at allowing interpretability of the data and will be referenced throughout the inference-statistical work presented below.

Table 3. Descriptive Statistics of Relevant Variables (own data)

	N	Mean	Std. Deviation
How do you perceive German education in comparison to education in other European countries?	1332	7,696	2,868
How do you perceive German education in comparison to education in the U.S.?	1332	6,983	3,064
How would you rate a German Engineering / Technology study compared to the rest of the world?	1332	8,191	2,933
How would you rate a German Business/Management study compared to the rest of the world?	1332	6,634	3,134
How attractive would it be, if you could enrich your Business/ Management studies with Engineering/Technology topics like Industry 4.0, IOT, Smart Mobility, Smart Cities, Smart Manufacturing or else?	365	8,915	4,589
How attractive would it be, if you could enrich your studies with Business/ Management topics like Innovation Management, Leadership, Design Thinking, or else?	500	8,414	4,219
How important do you rate the topic of Entrepreneurship (business modelling, idea to product, starting own start-up, etc.) as part of your curriculum?	1222	7,918	2,003

Assuming you could customize your studies, how much online, how much offline would you like to study?	1223	4,795	3,378
How attractive would it be to learn with snackable, bite-sized online contents that fit in your daily routines (e.g. 5 min video or 20 min audio contents on your study topics)?	1223	7,022	2,946
How attractive would it be to modify the study length depending on your personal situation (e.g. full time/ short duration vs. part-time/ longer duration)?	576	7,736	1,919
How would you rate a start online and resume offline study in the context of Covid-19?	1189	6,081	3,093

In those regards, an analysis was conducted to assess, whether the general perception of the German university and education system can be described as one scale or as individual measurements instead. A total of four items was used to assess participants' perception of German university and education system:

Table 4. Items used for Reliability Analysis "Overall Perception of German Studies" (own data)

How do you perceive German education in comparison to education in other European countries?
How do you perceive German education in comparison to education in the U.S.?
How would you rate a German Engineering / Technology study compared to the rest of the world?
How would you rate a German Business/Management study compared to the rest of world?

In order to assess whether those items form together one factor a reliability analysis following the Cronbach Alpha method was conducted (De Vet, Mokkink, Mosmuller & Terwee, 2017; Tavakol & Dennick, 2011). Such an analysis reveals whether items that are summarized within one hypothetical scale actually correlate strongly enough with this scale to warrant the construction of it. Tavakol and Dennick (2011) argue that Alpha-values between .70 and .95 are typically indicators of satisfying reliability, although for short scales – such as the one used here – even smaller Alpha-values can be viewed as satisfying. The result of the analysis for those four items revealed an Alpha-value of ALPHA = .934. This value indicates that the

four items used to assess the perception of German studies in fact do form one scale, which will therefore be computed for the subsequent analysis.

4.2 Hypothesis 1 – General Perception of German Universities

The first hypothesis that guided this study regarded the perception of German universities in comparison to other countries' universities. First, it was assumed that there is in general a positive perception of German universities. In order to analyze this assumption, the previously mentioned scale (formed from the four items described within the reliability analysis reported in section 4.1) was used as a relevant variable in a one-sample t-test. In order to show whether the perception of the system really is significantly positive the empirically found results were tested against a theoretical mean of $M = 5.5$ (stemming from the 10-point scale with a middle-point of 5.5) – if the perception of German universities is significantly above averagely positive, a significant result should be visible.

The analysis revealed that with an $M = 7.38$ ($SD = 2.74$) the perception of German universities is significantly above average ($t = 24.957, p < .001$). In order to further foster understanding of the overall perception, a second analysis was conducted: As was hypothesized, the perception might differ between international students already living within Germany and those still living in other countries. In order to do so, two groups were computed within the sample – participants living in Germany and those still living in other countries combined. Before conducting the t-test for independent samples a Levene's test for equality of variances was computed that showed to be not-significant ($F = .747, \text{n.s.}$), thus, equal variances could be observed for the further analyses. The t-test itself revealed a significant difference in regards to the perception between those living in Germany and participants still living in other countries ($t = 5.059, p < .001$), with students in Germany rating the university programs significantly worse (although with an $M = .694$ still very positively).

In regards to the first thesis it therefore can be conducted that the perception of German universities is overall a very positive one and even more so when being assessed by international students not (yet) living in Germany.

4.3 Hypothesis 2 – Enrichment Programs for the Future of Studying

It was proposed that different enrichment programs – such as enriching engineering programs with managerial or entrepreneurial contents or vice versa – would be perceived positively. In order to assess this hypothesis, a set of t-test analysis was conducted, again beginning with Levene's tests that proved to be not significant, thus allowing for the interpretation of tests with equality of variances assumed (see table 7). T-tests are used to assess whether differences between two groups are of statistical significance, with the Levene's test assessing the equality of variances between the two groups and thereby one of the requirements of the t-test.

Table 7. T-Test of Perception of Enrichment Programs (own data)

	Levene's Test for Equality of Variances			t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
How attractive would it be, if you could enrich your Business/ Management studies with Engineering/Technology topics like Industry 4.0, IOT, Smart Mobility, Smart Cities, Smart Manufacturing or else?	,143	,705	1,616	363	,107	,78908	,48817
How attractive would it be, if you could enrich your studies with Business/ Management topics like Innovation Management, Leadership, Design Thinking, or else?	,614	,434	1,829	498	,068	,69328	,37906

How important do you rate the topic of Entrepreneurship (business modelling, idea to product, starting own start-up, etc.) as part of your curriculum?	2,732	,099	3,387	¹²² 0	,001	,38883	,11479
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In general, in regards to the descriptive depiction of the results presented in table 3 within section 4.1 of this paper, it can be noted that enrichment programs are perceived as overwhelmingly positive by the participants. However, the perception of international students living in Germany and those still living in other places differs only for one aspect of this enrichment programs: the importance with which they rate entrepreneurship as part of their curriculum. Here international students still living in other places seem to place a significantly higher importance on the topic than those living in Germany do, although still very positively.

4.4 Hypothesis 3 – The Impact of COVID-19

The third hypothesis proposed that the COVID-19 crisis had an impact on students and their study behavior. To showcase the drastic effects, figure 1 shows the answers of participants in regards to how the crisis affected their educational experience.

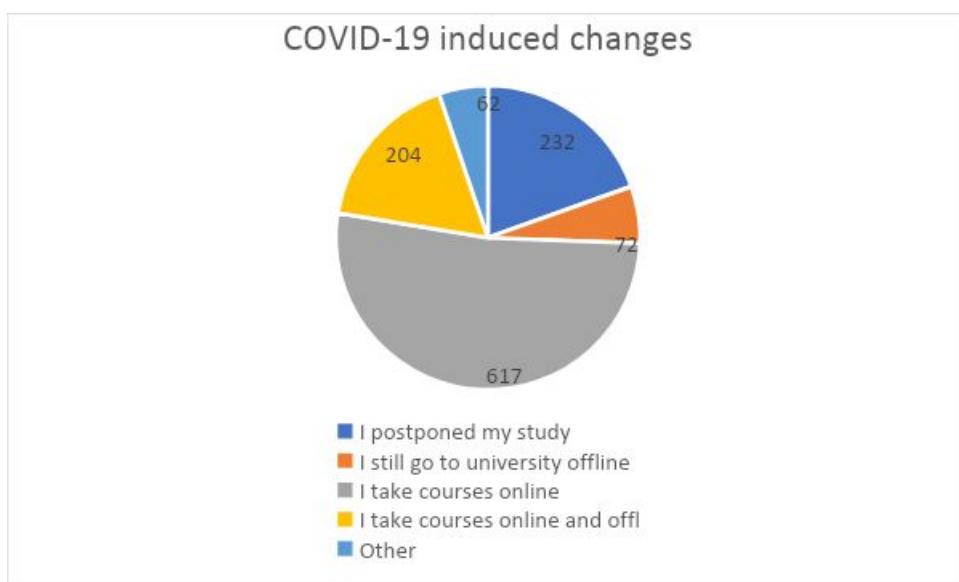


Figure 1. Description of COVID-19 Induced Changes to Students' Studies (own depiction)

In order to assess whether international students still living in other countries and those already living in Germany were impacted in the same way a cross-tabulation analysis was conducted subsequently, with the binary distinction between international students in Germany and international students still living abroad representing the rows of the table and the COVID-19 induced changes to the studies (see above) being shown as the columns (see table 5). A Pearson Chi-Square test was used to assess whether the differences showcased in table 5 were of statistical significance. This assumption could be observed based on the analysis ($Chi^2 = 86.655, p < .001$).

Table 5. Crosstabular Comparison of Covid-19 Induced Changes (own data)

		Since Covid-19, have your study plans changed? How have they changed?					Total
		I postpone d my study	I still go to university offline	I take courses online	I take courses online and offline	Other (please indicate)	
Other Countries	Count	177	45	272	115	48	657
	Expected Count	128,4	39,9	341,5	112,9	34,3	657,0
In Germany	Count	55	27	345	89	14	530
	Expected Count	103,6	32,1	275,5	91,1	27,7	530,0
Total	Count	232	72	617	204	62	1187
	Expected Count	232,0	72,0	617,0	204,0	62,0	1187, 0

The differences between the two groups seem especially drastic for the answer options *I postponed my study* and *I take courses online*: International students still living in their home country decided to rather postpone their studies (as the difference between observed and expected cases shows) than to take their courses online. The difference is true for international students already living in Germany: They seem to rather switch to online courses (345 observed cases in comparison to 275,5 expected cases) than to postpone their studies – a result potentially explainable by the fact that those living in Germany already changed their circumstances to accustom their study plans. However, a total of 55 of those students still decided to postpone their studies.

4.5 Hypothesis 4 – Different Learning Formats in the Light of COVID-19

In order to further foster understanding of the impact of the COVID-19 crisis on international students in Germany and the ones still living abroad alike, it was in a last step assessed how the perception of different learning formats differs between those two groups. A series of t-tests was conducted comparing the two groups in regards to their rating of hybrid programs, the usage of snackable, bite-sized online content as a supplement, and customized combinations of online and offline content. Before each t-test, Levene's tests for variance homogeneity were conducted, again showing no significant results, thus implying no need for correction of the main results for variance inhomogeneity. The results of the analysis are shown within table 6. It has to be mentioned that the scaling for the third item represented in table 6 differs from the others: while still ranging from 0-10, participants were here asked to determine the proportion between online and offline courses, with higher values implying a higher proportion of online courses.

Table 6. T-Test for Perception of Hybrid Learning Systems (own data)

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
How would you rate a start online and resume offline study in the context of Covid-19?	3,649	,056	3,352	1187	,001	,60196	,17960
How attractive would it be to learn with snackable, bite-sized online contents that fit in your daily routines (e.g. 5 min video or 20 min audio contents on your study topics)?	,748	,387	,567	1221	,571	,09609	,16952
Assuming you could customize your studies, how much online, how much offline would you like to study?	1,231	,267	1,280	1221	,201	,24872	,19430

The analysis revealed not only a generally positive attitude towards these approaches (as was shown within the descriptive results section) but also statistically significant differences between the two groups assessed: International students still living outside of Germany rate the option to start a study program online but to resume it offline on campus significantly better than those participants living in Germany already do (see table 6). Such a distinct differentiation between the two groups could not be observed for the two other variables analysed here: Neither the attractiveness of bite-sized online content nor the general preferred distribution between online and offline studies differed significantly between the two groups.

5 Discussion

5.1 Limitations and Critical Discussion

In general, the main hypotheses of this study could be confirmed: German universities are well perceived by the general public and by international students, as the literature overview showed. The COVID-19 crisis, however, seems to have a significant impact on students' university experience and even more so for international students, who tend to rather move their studies timewise than to shift towards online studies. Hybrid models, as they are discussed within the outlook towards the university of the future, are shown to be a possible alternative to combatting the adverse effects of the COVID-19 crisis on university programs. While these hypotheses could be confirmed, the present paper still makes clear that future research is urgently necessary in these regards: It remains unclear, in how far the changes arising from the COVID-19 crisis are already met by universities and how future students' expectations towards study programs might change. Also, the factor of digitization of education (and research, for that matter) will need to be addressed more strongly, as the present study indicates, that already (international) students expect more online courses. This, however, will raise the question, how student culture and cultural aspects of studying abroad will be influenced in general.

One of the main results of the present study lays in the description of the perception students hold of the German educational system with special regards to managerial and engineering studies. While the study revealed an overall very positive perception of German study programs, it has to be mentioned that this result is limited in its interpretability due to the nature of the sample used: As only students that in general consider international study programs were assessed within this study, mostly those who hold generally favorable mindsets and beliefs about studying abroad might be making up the sample. Only those students, the author argues, that hold a generally positive attitude towards Germany or internationalization and according to the education system might choose to study in Germany or abroad, thus limiting the range of the sample. The problem of such limited ranges within samples is one not uncommon within social sciences and educational research, as can be mentioned with regards to findings like the ones of Reis, Castro and Fernandes (2017) or Dahlke and Wiernik (2020). Range limitations thus seem to be a general challenge within comparable research that in many cases can barely be overcome by empirical means, as the range limitations typically occur not due to researchers' decisions but rather due to

self-selections within the sample. Thus, a critical comparison of results with relevant scientific literature is necessary to assess the validity of findings. For the finding of this study therefore a link can be made to research such as the one conducted by Oertel and Söll (2017) who argue that Germany's universities are in general well perceived by the international public. While typically not ranked among the top universities worldwide (a list that is typically dominated by US-American, British and increasingly Asian universities; see Times Higher Education, 2020), they are still described as above average both in terms of research and education quality. Thus, it seems plausible that the findings here – at least in a less accentuated form – might hold true even without the range restriction described. However, future research might find ways to counteract the problematic sample distribution of this study by asking similar questions in other geographical regions. The confounding of geographical regions with the results will for future and further research also be addressed by conducting statistical analyses of the existing data based on the different nationalities, therefore also showcasing differences between those regions or within regions itself.

By conducting a similar study outside of the country of Germany, another methodological problem might occur, that is described by Bortz and Döring (2007) among others: Social-scientific research tends to deliver the most reliable and valid results, if participants of a study are asked about concepts with which they have personal experience. Thus, by focusing on the sample used within this study, the range might be limited, however, the general validity of the ratings seems higher from this point of view: As within this paper only participants were asked to assess the quality of the German university system who also actively had experience with this system, it can be assumed that they are valid assessors.

The study further revealed the impact the COVID-19 crisis had on students and their study experience: Only a small minority reported mostly being not influenced by the crisis and still to take their courses offline. The majority of students switched to online courses or at least hybrid models, while a portion of the sample had to postpone their studies. This seems to hold especially true for international students still living in other countries, who disproportionately often had to postpone their studies due to the crisis and – again in comparison to international students already living in Germany – preferred not to switch to purely online options. This is a finding that seems to be in alignment with findings such as the ones of Ammigan and Jones (2018), Montgomery and McDowell (2009) or Heggins and Jackson (2003) who argue that studying abroad is typically not only a purely academic decision, but also one based on

expected experiences to be made. Thus, limiting the study experience to a purely online experience does not seem to be a viable option for international students, as major parts of the international experience might get omitted this way. Thus, the further analyses focused on alternative ways of offering studying experiences. Especially combined models were rated significantly more attractive by international students. This goes in alignment with the findings mentioned above: Universities can therewith react to the COVID-19 induced restrictions, while still offering international students at later stages the option to resume their studies in an offline way, thus enabling them to gain the whole experience they seem to expect from an international study program. In general, the perspective of international students seems highly relevant for the *university of the future*, as an increasing internationalization of universities seems to be a crucial success factor for universities, students and society alike. This goes in alignment with the mission statement presented by the aforementioned German Academic Exchange Service (DAAD, 2020b): The goal of *Strategy 2025* is to foster internationalization at German universities in order to promote the well-being of science, economy and society as a whole.

However, recently presented numbers in regards to applications from international students indicate that despite the COVID-19 crisis, Germany stays a highly attractive destination for international students (DAAD, 2020c). This is a positive result especially in the light of the on-going lack of highly qualified personnel within many branches that, a report by Stifterverband (2017) explains, can best be filled by acquisition of an increased number of international students that, subsequently, also benefit the German employment market.

However, in regards to the present study it needs to be noted that the position of international students is limited by the choice of the sample (see also section 3.3): While international students were analyzed, only those stemming from non-EU countries were considered. Thus, the perception here is one not shaped by programs and migrations within the European Union, but by a more globalized sample.

5.2 Conclusion

The present study showed a generally positive perception of German universities – both by international students already living in Germany and those still living in their home country, that were in the focus of the empirical work. The COVID-19 crisis however seems to complicate the situation especially for international students still living in their home country,

who seem more intended to move their studies to a later point in time than to shift towards purely online curricula. However, it could also be shown that various hybrid solutions seem to be a possible solution to combating the challenges arising from the difficult situation. The enrichment of studies by combining aspects of engineering with entrepreneurial parts seems to be also perceived in a favorable light. In general, both this research and the findings from scientific literature presented above indicate that the idea of student-entrepreneurship is a rising one: Students of all fields, including technical fields, seem to desire more entrepreneurial aspects of studies which seems to be especially true for international students as the present study shows. The question can be raised, whether international students – or expatriates in general – tend to favor more entrepreneurial aspects, as research by Ruthemeier (2021) shows: Expat-preneurs, thus expatriates turned entrepreneurs seem to share some common personality traits. Future research might point towards the question, whether in a similar vein, international-student-entrepreneurship seems to be a field relevant for further work. Given that many entrepreneurs in knowledge-intense industries have an academic background (Ruthemeier, 2021) and that international students tend to wish for more entrepreneurial content within their study programs, it seems to be a viable proposition that international-student-entrepreneurship is a group worth researching. Even though entrepreneurs with migrant background represent a relatively smaller number of the total population compared to local founders in Germany (DSM, 2020), the founding tendency of migrants is comparably higher to locals (KfW, 2020) and therefore presents opportunities also for international students. Already now, successful startup companies are often founded or at least supported by international team members, often with a university background (DSM, 2020). If universities manage to attract more international students and enrich their study programs with increasingly entrepreneurial aspects, they can actively contribute to the economic success of their region, as findings such as those of Cohan (2018) clearly show that universities already *are* strong drivers of entrepreneurial innovation.

All the findings presented throughout this paper, however, point back towards an observation made in the introduction of this paper: The university of the future, as Kosslyn and Nelson (2017) describe it, needs to rethink education and find new ways to combine academic quality with pragmatic aspects to prepare future business and thought leaders with the necessary *mental equipment* to combat the challenges that will arise over the next decades. This point – along with the need for strong internationalization of universities – is also highlighted by the

Strategy 2025 (DAAD, 2020b): Global academic collaboration can bring sustainability and peace to a world increasingly shaped by disruptions and crises. Fostering international academic potentials instead of maintaining borders that might prevent excellence therefore seems to be one of the key drivers of modern development.

Internationalization of universities remains an important task, as the introduction of this work concluded: Not only does it offer unique experiences and opportunities to students and universities alike, but also the impact on local economies has to be mentioned. COVID-19 might influence what international studying experiences will look like in the future – taken together with the research on *the university of the future* it becomes clear that the educational system will be facing a wide variety of challenges and disruptions in the foreseeable future. These will need to not only be addressed, but to be actively developed, in order to stay among the leading systems in the world. This however will require a sharpened understanding of the students' expectations in regards to digitalization, international experiences and the composition of study programs. Further research will be necessary to develop on the findings shown throughout this work: While these findings do point in the direction described above, more consistent approaches will be necessary to foster the field of research.

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Appendix A

	Frequenc y	Percen t
Afghanistan	1	,1
Ägypten	11	,8
Albanien	5	,4
Algerien	5	,4
Argentinien	11	,8
Aserbaidschan	7	,5
Äthiopien	1	,1
Australien	1	,1
Bahamas	1	,1
Bangladesch	3	,2
Bosnien-Herzegowina	1	,1
Brasilien	16	1,2
Chile	7	,5
China	40	3,0
Costa Rica	1	,1
Côte D'Ivoire	1	,1
Deutschland	583	43,8
Ecuador	2	,2
El Salvador	1	,1
Estland	1	,1
Finnland	1	,1
Frankreich	1	,1
Gambia	2	,2
Georgien	2	,2
Ghana	5	,4
Guatemala	1	,1
Indien	195	14,6
Indonesien	17	1,3
Iran	1	,1
Israel	2	,2
Italien	5	,4
Japan	7	,5
Jordanien	3	,2
Kamerun	9	,7
Kanada	2	,2
Kasachstan	4	,3
Katar	2	,2
Kenia	2	,2

Kirgisistan	1	,1
Kolumbien	32	2,4
Kongo, Demokratische Republik	6	,5
Korea, Demokratische	1	,1
Volksrepu		
Lettland	1	,1
Libanon	1	,1
Liberia	2	,2
Litauen	1	,1
Luxemburg	1	,1
Malaysia	7	,5
Malta	1	,1
Marokko	5	,4
Mazedonien	1	,1
Mexiko	89	6,7
Monaco	1	,1
Myanmar	1	,1
Namibia	1	,1
Nepal	9	,7
Neuseeland	1	,1
Niederlande	2	,2
Nigeria	33	2,5
Österreich	2	,2
Pakistan	18	1,4
Panama	1	,1
Papua-Neuguinea	1	,1
Peru	13	1,0
Philippinen	2	,2
Polen	2	,2
Portugal	2	,2
Republik Korea	15	1,1
Ruanda	13	1,0
Rumänien	1	,1
Russische Föderation	8	,6
Sambia	2	,2
Saudi-Arabien	3	,2
Schweiz	1	,1
Serbien	2	,2
Simbabwe	1	,1
Singapur	7	,5
Spanien	1	,1
Sri Lanka	5	,4
St. Lucia	1	,1
Südafrika	2	,2

Südsudan	1	,1
Thailand	5	,4
Trinidad und Tobago	2	,2
Tunesien	1	,1
Türkei	31	2,3
Ukraine	4	,3
Ungarn	1	,1
USA	7	,5
Usbekistan	1	,1
Vereinigte Arabische Emirate	6	,5
Vietnam	10	,8
Weißrussland	1	,1
Total	1332	100,0