

Work in progress – not for citation

The challenge of creating meta-inferences: Combining data representing institutional and individual perspectives on first-year support in higher education

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Keywords: Mixed methods, Meta-Inferences, Legitimacy

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1. Introduction

In Europe, increasing student numbers and student diversity (Wolter, 2013) have led to a general concern about study success (Vossensteyn et al., 2015) and to a particular interest in first-year students' transition into higher education (HE) (Jenert, Postareff, Brahm, & Lindblom-Ylänne, 2015). International HE policy appears to acknowledge that the diverse needs of first-year students have to be accommodated. In Germany for example, a recent public funding line has encouraged higher education institutions (HEI) to improve the overall quality of teaching and learning and the first-year support in particular. Over the last five years, HEI have thus introduced a broad range of first-year interventions, e.g. tutoring, remedial courses and writing centres (Hanft, 2015).

The current development corresponds with HE research that characterises the transition to HE as particularly challenging and stresses its importance for future academic performance and study success (Jenert et al., 2015). However, while in some countries, nation-wide surveys provide comprehensive insights into the individual and institutional factors that contribute to the first-year experience, only little is known about the transition to higher education in Germany. For example, Baik, Naylor and Arkoudis (2015) report findings from two decades of research on the first-year experience in Australia. Another example illustrates that in the US, first-year support programmes have been discussed as “high impact educational practices” (Kuh, 2008) due to their positive effects on study success. In Germany though, HE

research has only just started to examine the first year of university and the effects of the newly introduced support programmes (Bargel, 2015; Grützmacher & Willige, 2016; Hanft, Bischoff, & Prang, 2016). Hence, further research needs to shed light on the transition process as well as on the impact of the recently introduced support programmes, to facilitate an evidence-informed academic development (Hatch & Bohlig, 2016).

The notion of transition to HE expands the traditional focus on access and incorporates ideas of managing retention and supporting study success (Gale & Parker, 2012). From this perspective, study success needs to be conceived as an interplay of both “individual qualifications and the manner of studying on the one hand and conditions at the HEI and in the social environment on the other“ (Heublein, 2014, 511). To study the complex phenomenon of transition one needs to analyse the interplay of challenges for first-year students, first-year support and the study progress. Likewise, Jenert and colleagues call for studies, that “combine the diagnosis of students’ prerequisites with the design of adequate interventions for supporting the initial phase of studying and longitudinal assessment of students’ academic development” (2015, 17). It seems that, a combination of quantitative and qualitative methods is especially suitable to provide both, general insights into the student experience and a deeper understanding of the institutional interventions.

However, conducting mixed methods research implies several methodological challenges and it is still difficult to “obtain methodological advice on how qualitative and quantitative findings can be related to each other in order to achieve valid research results” (Kelle & Buchholtz, 2015, p. 323). In 2003 Teddlie & Tashakkokori identified drawing meta-inferences as an unresolved issue in mixed methods research. The term meta-inference refers to

“an overall conclusion, explanation, or understanding developed through an integration of the inferences obtained from the qualitative and quantitative strands of a mixed methods study”(Tashakkori & Teddlie, 2008, p. 101).

The authors suggest to denote the term to „connote both the process of interpreting the findings AND the outcome of the interpretation (i.e. the process of interpreting, as well as the emerging conclusions) to provide answers to the original research questions” (Tashakkori & Teddlie, 2008, p. 103).

Onwuegbuzie and Johnson (2006) state that “developing justified inferences is at the center of many problems in mixed research” (p. 54). Although in the last 10 years a huge body of methodological literature on mixed methods has been published, the practice of drawing meta-inferences still poses problems as Vekantesh and colleagues (2013) point out:

“The overarching goal of developing meta-inferences is to go beyond the findings from each study and develop an in-depth theoretical understanding that a single study cannot offer: a substantive theory of a phenomenon of interest” (Venkatesh, Brown, & Bala, 2013, p. 38-39).

In their literature review of empirical studies on information systems the authors indicate that only in very few cases meta-inferences are drawn.

In the present paper we will draw on a mixed methods study to give an example for meta-inferences and discuss the related problems and possible solutions. First we give an overview of the overall research design for studying students' transition, before we focus on one of the three main research questions: the effects of support programmes. We introduce the quantitative and qualitative methods employed and present first results. Finally, we discuss the challenges of drawing meta-inferences on data representing different perspectives on a research object. Furthermore we focus on the question of generalisability of different findings with regard to the different samples used in the quantitative and qualitative strand. As the article focuses on the process of creating meta-inferences, the discussion addresses the quality of meta-inferences as conclusions.

2. Research Design

The following paper reports findings and methodological questions from the research group StuFHe, that accompanies the recent activities in German higher education¹. We seek to contribute to the emerging field of study outlined above by investigating students' transition to higher education with regard to individual and institutional factors. As HE research provides two complementary approaches to study the student experience ((Pascarella & Terenzini, 2005)) and the transition to HE (Jenert, Postareff, Brahm, & Lindblom-Ylänne, 2015), the study aimed at combining both to develop a comprehensive theoretical framework. On the one hand, this framework integrates the psychological strand of research that examines transition in terms of variables related to academic performance such as motivational factors, learning strategies, approaches to learning and psychosocial contextual influences (Richardson, Abraham, & Bond, 2012). On the other hand, the framework adopts a socio-cultural perspective that conceives of transition as a process of socialisation (Huber, 1991), academic and social integration (Tinto, 1987), identity transformation and belonging ((Holmegaard, Madsen, & Ulriksen, 2014); (Ulriksen, Madsen, & Holmegaard, 2010)). In line with the notion that studies on transition to HE need to consider the interplay of individual and institutional factors that influence transition, our research project is guided by the following questions:

- 1) What profiles of academic competence can be identified and how do they develop over time?
- 2) What are the effects of first-year support programmes?
- 3) What role does student diversity play regarding the profiles and the development of academic competence and the effects of support programmes?

The first research question focuses on transition with regard to academic competence, which is defined as the ability to accomplish individual study goals and to meet institutional study requirements (Bosse, Schultes, & Trautwein, 2016). This notion of academic competence captures the individual capacity the study intends to investigate at three different points of

¹ It is funded by the German Federal Ministry of Education and Research (BMBF) (grant no. 01PB14005). Any opinions expressed here are those of the authors.

time for one study cohort. We expect that there are not only one, but several profiles of academic competences that may change over time.

The second research question focuses on the institutional context of transition in order to explore the role of support programmes for successful transition to higher education. This aspect will be examined in this paper in more detail.

Finally, for the third research question student diversity is conceptualised in three dimensions: individual, social and organisational diversity (Bosse, 2015). While individual differences point to students' different knowledge, skills and attitudes, the social dimension refers to classical socio-structural facets of diversity like gender, socio-economic status, ethnic background and educational biography. The organisational dimension captures students' organisational affiliation such as their degree program or type of HEI. We would like to find out if and how different dimensions of diversity are related to successful transition.

The overall research project follows a mixed methods design (Kelle, 2008; Kuckartz, 2014), combining a longitudinal student survey, document analysis and semi-structured interviews. The student survey is considered as quantitative, document analysis and semi-structured interviews as qualitative strands of the overall study. The following table provides an overview of the overall research project:

	Qualitative study	Quantitative study
Start	Methodological & theoretical foundation	
Phase 1	Classification of first-year support Document analysis & expert interviews	Profiles of academic competence 1 st wave of student survey
Phase 2	Short term effects in support programmes: Interviews with students	Profiles & Development of academic competence: 2 nd wave of student survey
Phase 3	Long term effects of support programmes: Interview with students	Academic competence & effects of support programmes: 3 rd wave of student survey
Conclusion	Consolidation & Dissemination of Results	

Table 1: Mixed methods-design of the StuFHe research project

As shown in Table 1, the research design can be broken down in two separate strands structured in three different phases:

First phase

Qualitative Document Analysis and expert interviews: The qualitative document analysis carried out from March to October 2015 was used to gain insight into the current practices of supporting first-year students in German HEI based on the outlines of support programmes on university websites. We complemented the collected data regarding the design of first-year support by means of expert interviews with programme coordinators of selected universities. Both methods served to gather information on the focus and the delivery of first-

year support, while the interviews provided deeper insights regarding the institution-specific implementation of support programmes and the intended outcomes.

Student survey (first wave): In the first wave of the longitudinal survey, which was initiated in October 2015, we asked students at the beginning of their first semester. Data was collected by means of an online-questionnaire including questions on students' social characteristics and information on their degree programme. Furthermore, to investigate academic competence the questionnaire included measures of self-perceived traits, skills and attitudes (e.g. intrinsic, extrinsic motivation, learning strategies). Interest as well as participation in first-year support and the respective evaluation complemented these individual questions. Besides, questions on the students' perception on first-year challenges were included. The collected data are currently being analysed.

Second phase:

Interviews with students: To explore the effects of first-year support, we conducted semi-structured interviews with students who had participated in selected programmes. The interviewees were asked to report on the challenges they had encountered during their first year, to describe the support programmes they had attended and to explain whether and how the programmes helped them to handle the first-year challenges and navigate the transition process.

Student survey (2nd wave): In the second wave, we will ask the same cohort (as in the first wave) one year after beginning their study programme. The questionnaire consists of almost the same questions as in the first wave. To capture study success, measures regarding the attainment of study goals were added. Furthermore, the second wave includes items regarding the students' experience of the learning environment. Data collection will start in October 2016. By comparing the results of the first and second wave survey we seek to reveal the development of academic competence.

Third phase:

Student survey (third wave): With the third wave we seek to provide further answers regarding the development of profiles of academic competence and relate it to support programmes. The data collection will start in October 2017.

Interviews with students: In 2017, additional interviews with students are intended to further explore the effects of support programmes from a long-term perspective.

After depicting the context of the larger research project, the query concerning the effect of support programmes (research question 2) will be outlined in more detail in the following section.

3. Studying the Effects of Support Programmes

To give a more detailed insight into the research on the effects of support programs, the research questions are divided into the mixed methods, the quantitative and the qualitative questions. The mixed methods research questions are the following:

- **What effects do first year support programmes have on transition?**
- What are the characteristics of students that participate in first-year support?

The qualitative questions are:

- **What are the typical features of first-year support programmes in German higher education?**
- **How do students perceive the effects of first-year support programmes?**
- How do diversity factors influence the participation in first year support and the perception of effects from the students' perspective?

The quantitative questions are:

- **Do students perceive the presumed effects of selected support programmes?**
- **Are there interrelations between the development of academic competence and the participation in support programmes?**
- Does the students' participation in support program vary according to certain diversity factors?

Due to the complexity of the different questions we will not discuss the diversity-related questions, but concentrate on the questions marked in bold face above.

3.1. Rationale for MMR: Focus on Support Programmes

Creswell and Plano Clark (2011) recommend for mixed methods researchers to give a rationale for their respective use of mixed methods design. Kuckartz (2014) suggests to do this for example by answering the question what perspectives or information would be missed, if only one kind of method was be used.

Theoretically, reducing the investigation of the effects to a quantitative study would be possible: One could use a quasi-experimental design and compare academic competence before and after attending a support programme. However, academic competence is a rather broad concept that includes e.g. motivation, self-concept, learning strategies and argumentative skills. As there are many factors that possibly influence academic competence during the time students participate in a support programme, it is not possible to account identified differences to the use of the programme. A quasi-experimental research design would only be suitable for measuring the development of very narrowly defined competences or knowledge gain. Furthermore, as the research project takes into account a broad range of first-year support practices, this research design cannot be applied. To explore possible relations between support programmes and the development of academic competence, we will contrast the profiles of academic competence of students who used support programmes with those not having attended any support program. Far from trying to make causal attributions, we can answer the question if there are correlative patterns or not.

In the qualitative strand effects of support programmes are mainly investigated in terms of self-reported benefits, i.e. how the individual students perceived the impact of support programmes regarding their transition process. While programme evaluation studies may identify different types of effects according to the intended learning outcome of an

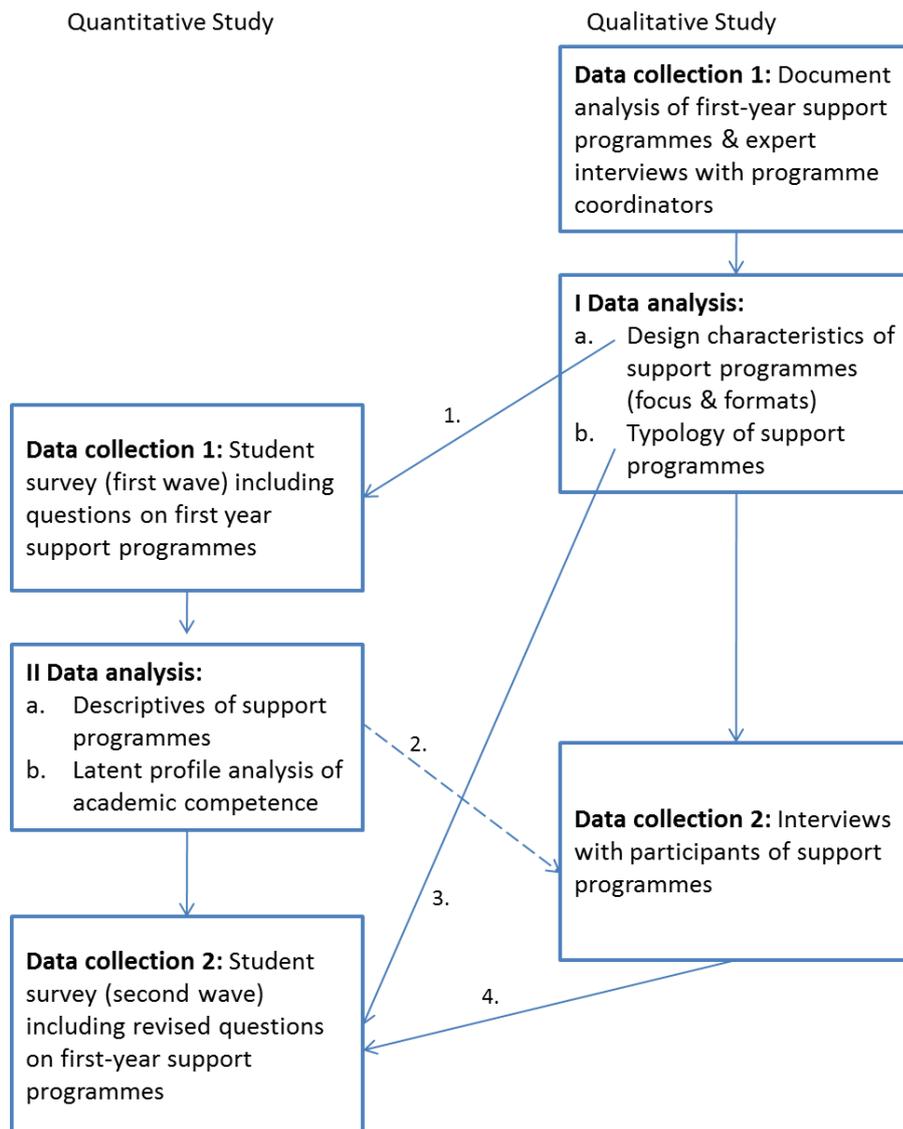
intervention, a heuristic frame that could guide the identification of effects of support programmes on a more general level does not exist. This is particularly true for first-year interventions in German higher education as there is not even a clear picture of how these support programmes are designed. Hence, an empirical study is needed to gain insights into the characteristics and to explore the effects. As qualitative methods are suited to provide in-depth data, document analysis and expert-interviews were selected to examine the design of first-year support programmes seeking to develop an overall synopsis. Furthermore, semi-structured interviews with students were used to obtain context-rich data on how and why students benefit from support. The interviews also served to explore the institutional context factors for successful first-year support programs. While the document analysis and the expert interviews provide an institutional perspective on the design of first-year support, the student interviews are intended to reveal the effects from an individual point of view.

Still, the research questions cannot be answered by only employing qualitative methods, as the number of students would be very limited and thus, the generalisability would be questionable. Besides, a systematic exploration of the relation between different diversity facets and the use of support programmes would not be possible.

3.2. MMR-Design

As Guest (2013) points out, it is sometimes difficult to characterise an overall research design, as there might be different purposes, theoretical orientations or relative importance for different research questions or phases. This is true for the present research project, because its overall approach is best characterised as a complex design with the integration of different phases (Kuckartz, 2014). Regarding the question of the effects of support programmes, one can find the characteristics of an exploratory design (QUAL-Quan-Model) (Creswell & Plano Clark, 2011). As delineated above, the primary purpose is, “to generalize qualitative findings based on a few individuals from the first phase to a larger sample gathered during the second phase” (p. 86). The reason for the qualitative study at the beginning is that for studying the effects of support programmes on a larger scale “measures or instruments are not available” (p. 86).

As the research questions outlined above show, the results from the qualitative strands are integrated in the quantitative strand with the aim of generalisation (graph 1 arrow 1, 3). However, with regard to academic competence this confirmatory character dissipates, as the quantitative strand plays the dominant role for this question. By investigating the relation between academic competence and support programmes, the qualitative study serves as a preliminary study, and the quantitative study connects the results with another research question (Qual-QUAN). We follow Guests advice and depict the interrelation of the different studies in a diagram, focussing on the “point[s] of interface” (Guest, 2013, p. 141).



Graph 1: Points of interface in the research design to assess the effects of support programmes

3.3. Data Collection/Sample

There are various ways of describing sampling strategies in the field of mixed methods. As different samples have to be considered, different perspectives are applied to characterize the sampling strategy: For the document analysis 80 HEI were selected, including the four institutions that were further investigated by the means of expert interviews (n=8) (Graph 1, Qual: Data Collection 1). The students of one cohort at these universities are the populations from which the sample for the quantitative student survey as well as the qualitative student interviews were drawn (Graph 1, Quan: Data Collection 1, Qual: Data Collection 1). This means we used multi-level sampling (Teddlie & Yu, 2007).

Although the research design is sequential, the sampling cannot fully be characterised this way. As Kemper, Stringfield and Teddlie(2003) point out “in sequential mixed models studies, information from the first sample (...) is often required to draw the second sample“ (p. 284). In the present study, the information gained in the quantitative sample only partly guided the sampling process in the qualitative sample (Graph 2, Arrow 2). Apart from the

students who participated in the online survey and stated they would volunteer for an additional interview, we invited students via the programme coordinators of selected support programmes. This additional sampling strategy was necessary as there were only a small number of volunteers who had actually participated in first-year support.

To address the research question on the effects of support programmes a parallel mixed methods sampling method was applied, where “the samples for the qualitative and quantitative components of the research are different but are drawn from the same population of interest” (Onwuegbuzie & Collins, 2007, p. 292). While all participants were enrolled in the first semester of the four HEI, not all of the students interviewed had participated in the online survey.

Qualitative Sample: Sampling focused on the HEI funded by the German Federal Ministry for Education and Research to improve the quality of teaching and learning within the so called Quality Pact (BMBF, 2010). All universities that had used the funding to introduce first-year support programmes² and at the same time intended to address student diversity were selected.³ This purposive sampling led to a selection of 80 HEI for the document analysis, including four HEI, where the expert interviews (n=8) as well as the student interviews (n=20) were conducted. The four institutions represent different types of universities as two are full universities and two are universities of applied sciences. Furthermore, they are located in two different federal states and their profiles differ with regard to the degree programmes and subjects offered.

Quantitative Sample: For the first wave of the online survey all students enrolled in the first semester of the four selected German HEI were contacted. A total of 2,222 participants were included in the quantitative sample for this study. This is a response rate of 14,5%, with 10 % of the respondents completing the survey. The four HEI were represented unequally, as they differ in size and response rate (e.g. the students of the largest university constitute 52% of the sample). Comparing the data from the four institutions showed high similarities in the composition of the sample with regard to relevant student characteristics. The gender and age distribution though differs slightly, as there are more female and more younger students in the sample than in the respective student populations.

3.4. Data Analysis

Qualitative analysis of documents and expert interviews: The collected documents as well as the expert interviews were analysed thematically, following a systematic procedure of deductive and inductive coding supported by the qualitative data analysis software MAXQDA (Kuckartz, 2014; Schreier, 2012, 2014). Based on the research question, the thematic categories included basic information on the selected HEI (e.g., type of institution, number of students enrolled) and their overall mission guiding the implementation of first-year support. Mainly, the analysis was directed at the design of the support programmes to identify their focus (i.e. the target groups and first-year challenges addressed) as well as the formats used to deliver and to organise the support. In the course of the coding process, the category system

² In Germany, there exist 427 different HEI. In the Quality Pact 186 HEIs received funding.

³ The respective information is provided on the website of the Quality Pact: <http://www.qualitaetspakt-lehre.de/de/3013.php>.

was refined by developing subcategories based on the data. After the document analysis was completed, the audio recorded expert interviews were transcribed verbatim and coded following the same category system. In a second step, the latter was further expanded by introducing and subsequently refining additional thematic categories in order to capture the data regarding the implementation process of the support programmes.

Quantitative analysis of student survey (first wave): For the support programmes we calculated descriptives for the use and the evaluation of the question, how useful the respondents considered the support programme they attended. Furthermore, to prepare the analysis of the development of the academic competence, a confirmatory factor analysis was conducted. To calculate a structural equation model of academic competence, we computed the measurement models and included self-concept, motivation, need for cognition, autonomy orientation, learning strategies, action control and goal commitment. The structural equation model informs the selection of factors to calculate the profiles with a Latent Profile Analysis. These profiles are currently calculated.

Qualitative analysis of student interviews: Again, data analysis followed the principles of Qualitative Content Analysis to develop and refine the category system. Apart from the students' understanding of successful studying and the reported first-year challenges, the thematic categories were designed to capture the central characteristics of the support programmes the interviewees attended (e.g. the focus, methods and organisation) as well as their effects from the student perspective. This included categories for the individual motivation, participation and benefits the students reported. While the analysis still needs to be completed, a preliminary version of the categories system has been developed.

Quantitative analysis of student survey (second wave): The factor analysis will once again be the base for the measurement models and the structural equation model. In the second wave an outcome variable like self-reported study progress will be taken into account. Once more, latent profiles will be analysed. Furthermore, the relation to the profiles in the first wave will be evaluated by a latent transition analysis. To assess the effects of support programmes, we will correlate the use of support programmes with the results of the latent profile as well as the latent transition analysis. These calculations will be conducted in the third wave again.

4. Results

Although the overall research project is still in progress, we can present first findings from the first phase and the beginning of the second. The following research questions are addressed:

- What are the typical features of first-year support programmes in German higher education?
- Do students perceive the presumed effects of selected support programmes?⁴

⁴ The research question about interrelations between the development of academic competence and the participation in support programs cannot yet be addressed, as this requires the quantitative results of the second wave of the survey. Currently, the profiles of academic competences are modelled for the first wave, thus, the results for the second wave will be accessible next year. Likewise, to answer the

We draw on the document analysis as well as on selected findings of the student survey issued to the students of the four HEI four weeks after the start of their first semester. Based on a preliminary category system developed in the qualitative document analysis, the students were asked about the first-year support programme they had attended. Furthermore, they were requested to identify the support programme they considered the most beneficial for their transition to university and to assess its effects. Finally, we asked the participants in what kind of future first-year support they were interested in.

Attended support programmes & services used (n=2,154))	Share of participants considering the programme most beneficial (%)
Induction to university and study programme (n=1534)	59.2
Remedial courses (n=420)	36.7
Mentoring (n=125)	21.5
Counselling & advising (n=368)	14.9
(First-year) Tutoring/Study group (n=603)	14.5
Events for future students (n=764)	12
Online-information about study programme (n= 1644)	11.9
Information material for new students (n=964)	6.2
Online-(self-)assessment regarding expectations/knowledge (n=805)	4
Other support (n=69)	3

Table 2: Support programmes included in the student survey (1st wave)

Table 2 presents the items used in the first questionnaire that were designed to represent the support and information services available at pre-entry and the very beginning of the first semester. While the labels were based on the document analysis of the overall sample, we included few examples corresponding to specific programmes and services available at the four partner institutions. The number of respondents indicating that they attended a programme cannot be used to draw conclusions about the support programmes (e.g. regarding their popularity): The small share of students that participated in mentoring programmes, for example (n=125), may not result from low acceptance, but rather point to the fact that mentoring is provided less than online information or induction activities.

To approach the question of the effects of support programmes we asked participants to evaluate the usefulness of the attended programme. They were asked which of the mentioned programmes they considered most useful for transition and to name the most useful. We

qualitative question how students perceive the effects of first-year support programmes, the results of the student interviews, which are due this winter, are needed.

coded the answers to this open question with regard to our categories in the questionnaire. Table 2 shows, that induction to university (59.2 %) and remedial courses (36.7%) are considered very useful. Surprisingly, one-to-one formats like mentoring (21.5 %) or counselling and advising (14.9 %) are only relatively seldom considered most useful. However, these numbers only give a preliminary insight, as the respondents were asked four weeks after the start of their study programme. There were certain challenges they had not met until then and thus their reference for the assessment of usefulness was a rather narrow spectrum of transition experience. Nonetheless, the induction to university seems to be the most impressive support programme from the students' perspective.

A second approximation to the effects is approached with the question, in what way the participants considered the support useful. Each respondent was requested to evaluate certain modes of effects with regard to the support they indicated most useful (e.g. The support programme helped me - to understand the contents of my programme better, -to realize what learning strategies I could use – to get acquainted with other students etc.). With the answers to this question, we can calculate a profile for each kind of support programme included in the questionnaire. Thus, the students gave us insights into their evaluation of the usefulness of selected programmes and their assessment of the aspects that made these programmes helpful.

However, the in-depth document analysis and expert interviews conducted after the construction of the first questionnaire revealed, that the Quality Pact led to a differentiation in the support programmes. The conventional formats like tutorials and remedial courses still exist, but are conducted in many different ways and complemented with new formats and hybrid forms. Thus, the central question is how to generate an appropriate point of reference for integrating the quantitative and qualitative findings regarding the support programmes students used and the effects they reported.

To identify the different support programmes a common frame of reference was needed, that went beyond traditional labels for the support programmes available and would be based on their different characteristics instead. Thus, to compare the programmes implemented in the four different institutional contexts and relate the reported effects, a typology was developed that identified the support programmes with regard to their different functions for the transition to university. In combination with the examples from the different HEI, the developed typology can serve as a research-based differentiation of support-programmes.

Function for transition	Main characteristics			Examples
	Focus (addressed first-year challenges)	Format of delivery	Form of organisation	
1 Guidance on study choice	Study choice, Course structure & organisation	Print/online information, (Self-) Assessment, Counselling	Pre-entry, additive, individual	– Online Self-Assessment
2 Induction to university and course orientation	Study choice, Course structure & organisation, Orientation on campus, Peer relationships	Tutoring/mentoring, Print/online information, Counselling	At semester's start, additive, group-based	– induction week
3 Facilitating study progress	Study choice, Course structure & organisation, Orientation on campus, Peer relationships, Learning strategies & time management, Coping with pressure to perform & failure, Self-reflection	Tutoring/ mentoring	Continuous, additive, individual / group-based	– first-year seminar
4 Enhancing subject knowledge	Subject knowledge, Preparing lectures	Remedial/developmental courses, Tutoring/ mentoring	Pre-entry /continuous, additive, group-based	– remedial math courses
5 Enhancing academic skills	Academic Writing, Scientific skills, Learning strategies & time management, Coping with pressure to perform & failure, Self-reflection, Soft skills, Media literacy, Presentation skills, Practice & professional orientation	Remedial/developmental courses	Continuous, additive, group-based	– study success courses
6 Academic advising & counselling	Academic Writing, Scientific skills, learning strategies & time management, course structure & organisation	Tutoring/ mentoring, counselling, study centre	Continuous, additive, individual	– peer tutors for academic writing
7 Guidance for self study	Subject knowledge, Self-assessment, Self-reflection, Individual studies	Material for self study, Journal/ Portfolio, (Self-) Assessment	Continuous, additive, individual	– STEM online tutorial
8 Providing applied learning experiences	Practice & professional orientation, Research orientation, Soft skills	Project work, curricular / course reform	Continuous, integrative, group-based	– project work
9 Providing flexible study pathways	Individual studies, Interdisciplinary studies	curricular / course reform	Continuous, integrative, individual	– extended first year (3 semesters)

Table 3: Typology of first-year support programmes

As Table 3 shows, the function for transition is related to the range of first-year challenges they address according to the description of their topics. Furthermore, the functions are connected with specific formats of delivery as well as with forms of organisation. *Guidance on study choice* (1) for example, is delivered as print or online-information and provides orientation towards content and structure of study programmes (e.g. study programme specific online-assessment). Furthermore, *induction to university* (2) broadens the targeted challenges by including social and organisational challenges like e.g. building relationships with peers and orientation on campus, and is provided via tutoring or mentoring. While the first programme is scheduled before the start of the semester, the second programme takes place at the beginning of the semester. Applied to the data on each of the four institutions, it is intended to characterise their specific profile with regard to the support provided to first-year students. In relation to the question on support programmes and diversity this institution-profile will entail information on the proclaimed target groups (e.g. discipline specific or social groups).

In the second wave of the longitudinal survey, we adapted our items for the support programmes to the typology. As the different HEI have varying names for similar support programmes, we included the individual programme names of each institution. This time, we aim to include a broader range of institution specific examples by means of four institution specific questionnaires (see Table 4).

The comparison of the questionnaire in wave one and two reveals several differences (see Table 4): First, we excluded the pre-entry support services regarding the study choice because we wanted to narrow down the options to the most important dimensions of our research (i.e. the support provided during the first year). Second, the changed description included two more types of support programmes that were not included in the first phase. Especially the last one, the individualisation of the course of study can be understood as innovation in the curriculum design in Germany. Finally, especially the classification of mentoring, tutoring and counselling to one dimension becomes more difficult, as these formats are used in different contexts. The document analysis revealed that the format of delivery is not selective regarding their function. The new classification as an inference from the qualitative study considers the new development in the field of first-year support in Germany and establishes the basis for future meta-inferences.

In the second wave, as well as in the first wave, we will ask the students to evaluate the usefulness of the attended programmes and assess the aspects they consider most useful. However, we made several changes in the questionnaire: We consider the data on support programmes in the second wave more important, because the students a) now could have made use of a broader range of support programmes and b) may have met more challenges related to transition and thus can assess the usefulness of the programmes better. In the second wave, they are not requested to name the most useful programme but to evaluate each programme they attended with regard to, how helpful it was for their transition. This way, we hope to gather more information on support programmes.

Questionnaire first wave	Questionnaire second wave
Question: Did you attend one of the following support programmes, before or at the beginning of your semester?	Question: Your University provides several support programmes to facilitate transition. Which of the following support programmes did you attend during your first year? During my first year I used support
Induction to university and study program	- for an orientation at the first-year's start (e.g. welcome week, induction days),
Remedial courses	- for expanding or refreshing my subject knowledge (e.g. remedial courses, supplemental tutoring)
Mentoring	- for organising my courses and learning activities (e.g. first-year seminar, mentoring)
Counselling & advising	-for academic advising & counselling (e.g. on course selection, study skills)
(First-year)Tutoring/Study group	- for developing academic skills (e.g. courses on learning strategies, time management, academic writing)
Events for future students	-
Online-information about study program	-
Information material for new students	-
Online-(self-)assessment regarding expectations/knowledge	- for self-study and self-assessment (e.g. online courses, ,, placement exam)
Other support	
	- for gaining insights into professional or academic fields (e.g. project based learning, inquiry based learning, lab/internship)
	- for following an individual study pathway (e.g. extended first-year, individual course choice, part time-study)
Response option: Select / select not	Response options: - I used this programme, - I did not use this programme although it was provided - I did not use this programme as I don't know it or it wasn't provided.

Table 4. : Operationalisation of first-year support in the first and the second wave of the survey.

Finally, we developed a question to explore what aspect of the attended support programmes were considered helpful. While the items in the first wave were derived theoretically from the support programmes' outlines, in the second wave we draw on the information we gained in the student interviews. For example, students are asked to assess whether it was helpful that the support corresponded to the topics of their course of study, allowed them to reflect upon their study skills and objectives, etc. The items in the second wave are more specific than before and we hope to find out, if the results from the interviews can be generalised and whether we can thus draw meta-inferences regarding the ascribed effects of support programmes.

5. Discussion

In order to illustrate the process of drawing meta-inferences, we described the research process in detail. To assess the effects of support programmes the mixed methods research design combines quantitative and qualitative methods. The document analysis reveals a differentiation in the delivery formats of support programmes and results in a new typology of first-year support programmes. The qualitative results (e.g. in form of the typology) are integrated into the quantitative questionnaire, thereby providing a base for meta-inferences on the effects of support programmes.

The meta-inferences regarding the effects of support programmes of the second wave of the longitudinal survey will answer the following questions:

1. What type of support programme is considered helpful by participants?
2. Do students perceive the presumed effects of certain types of support programmes?
3. How is the development of certain types of academic competence related to the attendance in certain types of support programmes?

These questions differ from the overall research questions outlined above, as they refer to types of support programmes. Although the analysis of the second wave of the survey as well as the student interviews are not completed yet, several questions already can be discussed. A first question refers to terminology: Are the answers to these questions already meta-inferences, because they combine qualitative results (typology) with quantitative results?

Furthermore, two methodological queries can be raised:

1.) A methodological question is the legitimacy to draw conclusions on support programmes on the basis of the developed typology. As outlined above, we developed the typology of support programmes in order to compare different support programmes in different institutions. If we relate the answers of the students to this typology, we integrate two different views and data: While the document analysis and the expert interviews represent the institutional perspective of first-year support, the student survey data depicts the individual perspective.

As the typology is based on the presentation of the institutions it is unclear, whether the students recognise the respective support programme they can provide information on. Therefore, in the second wave, the typology is translated into items and combined with actual examples from the four different HEI. These institution specific names should assist the students to identify the attended support programme. However, the names and formats vary in different institutions as well as in the different faculties or departments and we cannot include all the different titles of support programmes. If students cannot find the name of their support programme they have to decide from the description of the category which one fits best to the selected programme. Especially due to the differentiation and the new formats in the field, that are sometimes hybrids of classical formats, it may be difficult to make this decision. This basic problem of every typology-based item-formulation is exacerbated by the fact that the typology is formulated from the institutional perspective. We included the option “other” for this case.

The question remains if from the student perspective the different types of programmes refer to the courses and information they made use of. From a methodological point of view one has to answer the question, if “the same phenomenon is investigated with the help of different methods” (Kelle & Buchholtz, 2015, p. 332), or if we study different phenomena, with the institutional perspective on the one and the student experience on the other hand.

To validate the typology we can examine the answers to the question, what aspect of the support programme the respondents consider helpful. A low variance in the answer for one type can be interpreted as a validation for the typology. Additionally, in the third phase of our study, the typology of support programmes resulting from the institutional description of these programmes can be refined and validated from a student perspective in the interviews. However, it remains an open question, if the typology as a frame of reference is adequate.

2.) Furthermore, a second methodological question regarding the integration of the quantitative and qualitative findings concerns the generalisability. We can differentiate internal from external generalisability (Maxwell, 1992), with the former “referring to the generalizability of a conclusion within the underlying setting or group, and the latter pertaining to generalizability beyond the group, setting, time, or context” (Onwuegbuzie & Johnson, 2006, p. 49). From a quantitative perspective one has to assess, what the population is, the study aims to draw inferences on.

There are two different perspectives on the question of generalisability regarding the effects of support programmes:

The sample size of the student survey is large enough to draw representative conclusion about the four HEI it was conducted at. Moreover, the composition of the sample resembles the one of the population of the four institutions. If the comparison with the student body of first-semester students in Germany provides adequate results, the aim is to draw conclusions for this population.

To analyse the development of academic competence in relation to the attendance in support programmes, the latter is understood as property of the students. Thus, if we find patterns in the relation between the two, one can argue that we can generalise it to the third semester student body in Germany. For the students in the third semester we might then generalise, that students in the third semester in Germany show an increase in academic competence after attending a tutorial (hypothetical example).

On the other hand, one might claim, that we can only generalise our findings on the sample of the qualitative document analysis the typology is based on. The qualitative sample consists of 80 institutions, which include all Quality Pact financed first-year interventions that intend to address student diversity. This is the population as well as the sample regarding the document analysis. Expert interviews and student interviews as well as the survey data though are based on a selective sample of four institutions. The description of the effects based on the interviews and the survey data will be related to the respective type of first-year support. The findings are illustrative and seek to characterise the different types of support programmes as well as different types of students using support. As the qualitative study cannot claim to

generalise the findings beyond the sample, one might as well argue, that the inferences drawn from the quantitative findings can be made for the 80 institutions of the sample. However, this question needs to be further discussed with regard to validation strategies in qualitative and thus, in mixed methods research.

Further research will give insight into the question, if the typology can be applied to the other Quality Pact support programmes for transition or for all transition oriented programmes. For a start, the typology can be used as meta-framework to integrate and compare the findings on support programmes from other empirical studies.

The detailed description of the integration of different data contributed to the discussion on meta-inferences by providing an example of drawing meta-inferences in a longitudinal study. Furthermore, we were able to raise two methodological issues regarding the integration of two different methods: The question of combination vs. integration and the issue of the range of generalisation of the findings.

6. References

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