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## The relevance of study programme structures for flexible learning: an empirical analysis

### Abstract

Flexible learning is usually related to e-learning in order to create flexibility in the pace, place and content of study programmes. However, this is not the only study programme structure that can provide flexibility to learners. This article shows that other options, such as a high percentage of elective courses, a small amount of teaching hours, or a regular distribution of exams, improve the fit between the needs of a diverse student body and study structures. In order to test this correlation, a structural equation model is conducted using survey data from two German Universities of Applied Sciences.

### Keywords

Flexible learning, study programme structures, study conditions, diversity, e-learning

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# 1 Introduction

Multiple political strategies have addressed flexible learning in Germany during recent years (HOCHSCHULREKTORENKONFERENZ, 2014; WOLTER, BANSCHERUS & KAMM, 2016). Several state-funded projects focused on widening participation, part-time studies, and the development of distance education or blended-learning courses within traditional face-to-face study programmes (e.g. *Aufstieg durch Bildung*, *Digitale Hochschulbildung*). The aim of flexible learning is to create an environment in which students can adapt aspects such as the pace, place and content of their study programme to meet their own needs. Most research focusses on flexible learning through distance education and e-learning (ANDRADE & ALDEN-RIVERS, 2019; GORDON, 2014; GUEST, 2005). This is not surprising given that e-learning provides several advantages: it allows high flexibility in time, place and content distribution. However, e-learning is not the only study programme structure that can provide flexibility to learners (LI, YUEN & WONG, 2018). Other options, including *elective courses*, *the timing of courses*, or *the amount of teaching hours in relation to self-learning time* are often easier to implement, as a substantial share of professors prefer classroom teaching over e-learning (BUSS & KELLER, 2019; KREIDL, 2011; MACKEOGH & FOX, 2009). Particularly in higher education systems where professors have high autonomy, external incentives or top-down policies do not foster higher acceptance of e-learning. Therefore, other study programme structures should be considered in order to gain flexibility (BUSS & KELLER, 2019; VAN ACKEREN et al., 2018).

But what do we know about the effects of other study programme structures? Do they really enhance flexibility? In comparison to e-learning, there is little empirical evidence regarding structural elements such as hours of weekly classroom teaching, the percentage of elective courses, or the distribution of assessments and deadlines over the semesters; nevertheless, these structures are generally accepted as important factors affecting programme quality. As the theoretical background, I use a concept from the German scientific community, named *Studierbarkeit*, and relate it to the person-environment-fit theory.

To sum up, this article questions whether the study programme structures mentioned above increase the students' perceived flexibility, and thereby their satisfaction with their study programme. To test this hypothesis, I conduct a Structural Equation Model using student survey data for two Universities of Applied Sciences in Germany.

The results show that several study programme structures other than e-learning allow working students, students with care responsibilities or disabled students to study at their own speed, attend the courses they want, and to devote enough time to self-learning.

## 2 Theoretical background

Flexible learning is a broad concept, aiming to increase the flexibility of (1) time and pace, (2) content, (3) entry requirements, (4) content delivery, (5) instructional approach, (6) assessment, (7) resources and support, (8) orientation and goals, and (9) location of learning (BOER & COLLIS, 2005; LI et al., 2018). Its focus lies on the instructor's choices of how to design his or her course. The framework for flexible learning in higher education broadens this perspective, and defines the institutional systems and structures as important factors in implementing flexible learning systematically (HEA, 2015). According to this perspective, I argue that institutional structures should not only include systems that support professors in their individual flexible teaching; rather, real flexibilization of learning in higher education also has to be secured by a flexible study programme structure and organization.

In order to analyse if and how the structure of study programmes enhances flexibility for the students, two theoretical perspectives are of interest. First, the concept of structural *Studierbarkeit* argues that structural and organizational elements of a study programme influence students' learning behaviour. Second, the person-environment-fit theory argues that a good fit between students' needs and study programme structures facilitates high satisfaction.

## 2.1 The concept of “structural *Studierbarkeit*”

*Studierbarkeit* is an important concept in German higher education and in quality assurance, as it is one aspect of the accreditation processes. *Studierbarkeit* describes whether a study programme creates good study conditions, which allow a diverse student body to finish their studies in an adequate period of study, and with adequate learning outcomes. There are only few concrete definitions of *Studierbarkeit*. In general, authors distinguish between factors that can be influenced by the university on the one hand, and individual factors on the other. The factors that can be influenced by the universities are aspects of counselling and support, interaction with teachers and students, the structure of study programmes, the number of exams, overlap of courses, and technical equipment (KREMPKOW & BISCHOF, 2010; KUHLEE, VAN BUER, KLINKE & SIGBERT, 2009; STEINHARDT, 2011). Individual factors include employment and parenthood, entry requirement and migration backgrounds. In the sense of the person-environment-fit theory (see Chapter 2.2), however, I assume that the individual aspects do not represent aspects of *Studierbarkeit* itself. I rather ask: for which groups of students (e.g. those in states of employment or parenthood) can a study programme be studied effectively, and provide a good fit between needs and structures?

As the definitions of *Studierbarkeit* are quite broad, and therefore cannot be tested empirically, I suggest a new definition of *Studierbarkeit* based on the work of BURCK & GREDEL (2011), focussing on structural elements that influence students’ behaviour. This definition can help to understand which study programme structures, in addition to the teaching itself, can enhance flexibility by influencing students’ learning.

*Strukturelle (structural) Studierbarkeit can be defined as institutionally anchored study programme structures that influence the behaviour of students – in particular attendance of courses, self-learning time and taking examinations. The study structures take into account the time restrictions of students (employment, care responsibilities, disability) and, through ap-*

*appropriate flexibility, enable students to study successfully within their time resources.* (BUSS, 2019, S. 12)

I describe *structural Studierbarkeit* consisting of the following five aspects:

1. Place and time of the courses (e-learning, elective courses, timetable)
2. Hours of classroom teaching, and distribution of workload or exams over the semesters
3. The possibility of taking a break from studying, and duration of studies
4. Flexibility in the study programme (e.g. part-time studies, distance education)
5. Counselling and support which takes into account the diversity of the students and supports their orientation within the educational system

Study structures influence the actions of students, as actions arise in interaction with structures (SCHIMANK, 2010). Study structures are regulations and obligations that represent institutionalized norms for students.

## **2.2 Flexible learning and person-environment fit**

The person-environment-fit theory claims that students' satisfaction is high when study conditions are in line with the students' abilities and requirements (CAPLAN, 1987; EDWARDS, CAPLAN & HARRISON, 1998). First, satisfaction arises from the comparison between the professors' demands (teaching) and the students' abilities. Second, it concerns the fit between students' needs and offers. A high level of satisfaction is to be expected if (1) the offers (e.g. study structures, timetable) meet students' needs and (2) the offers are better than anticipated by the students (APPLETON-KNAPP & KRENTLER, 2006). Figure 1 demonstrates the described relationships.

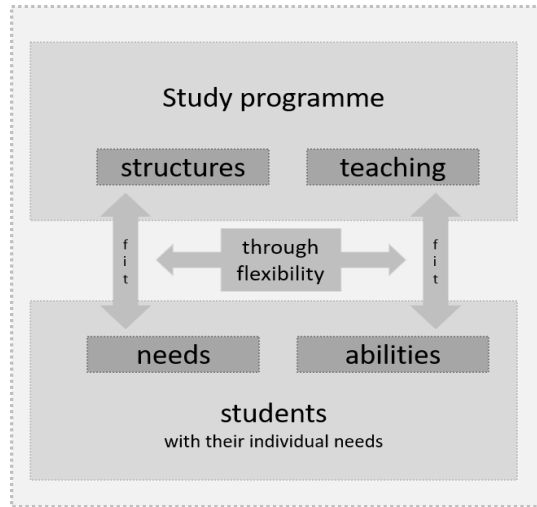


Figure 1: Person-environment-fit theory adapted to teaching and learning

When applying this theory to structural *Studierbarkeit*, flexible study structures should allow students to adapt the studies to their personal needs. These needs can result e. g. from from employment, parenthood, care responsibilities or disabilities. If students report a high person-environment fit because the structure meets their needs, this can be observed by their study behaviour – especially attending lectures, devoting time to self-learning, postponing exams, and an improvement of the work-life-learn balance.

*Hypothesis 1:* The higher the flexibility of study structures, the higher the fit between students' needs and the study programme. The higher this fit is, the fewer problems students have in their study behaviour.

Satisfaction is one outcome of structural *Studierbarkeit* (BUSS, 2019). Therefore, flexible study structures should provide a good fit for the needs of a diverse student body.

*Hypothesis 2:* The higher the fit between students' needs and study programme structures, the higher the students' satisfaction.

### **3 Literature on study programme structures for flexible learning**

As mentioned earlier, we know little about the effects of study programme structures on student behaviour, duration of study, dropout rate or perceived flexibility. In order to provide empirical evidence, only structures that vary between study programmes will be analysed in this article. In terms of analysing the five aspects of structural *Studierbarkeit*, only the first (place and time of courses, e-learning, elective courses, timetable), the second (hours of classroom teaching, distribution of workload and exams) and the fourth aspect (part-time studies, distance education) differ on the programme level. In order to specify the implementation of these aspects in study programmes, I focus on the *percentage of elective courses*, the *teaching hours per week*, the *regular or irregular distribution of exams* and the *percentage of online-learning courses*.

This section gives a short overview of relevant research concerning these aspects (overview see table 1). A broad body of literature exists on individual and didactical factors influencing course attendance (for an overview, see SCHULMEISTER, 2015). Some of these studies also take into account the teaching hours per week (*Semesterwochenstunden*, SWS) or the workload. They show three different effects. First, a larger amount of classroom teaching time is related to a reduction of self-learning time, especially when teaching is organized in 2-hour intervals (SCHULMEISTER & METZGER, 2011). When many courses introduce mandatory attendance, this reduces the time spent on the other classes (CHEN & OKEDIJI, 2014). Second, VAN DEN BERG & HOFMAN (2005) show that a higher proportion of small courses reduces study speed, and students postpone their exams. The reason for this longer study time can also be found in the available self-learning time. Due to a high number of face-to-face lessons or parallel courses, students

focus less on the different course contents and have little time for self-learning. Third, the work-life-learn balance is affected by a high quantity of teaching time. In particular, working students or students with children cannot attend as regularly as they wish (BUSS, ERBSLAND, RAHN, MÜLLER & HUSEMANN, 2018; BUSS, 2019; NATIONAL UNION OF STUDENTS UK, 2009).

Table 1: Overview of relevant research

<i>Structural element</i>	<i>Is related to...</i>
Teaching hours per week and their distribution	Self-learning time Work-life-learn balance Duration of study
Percentage of elective courses per study programme	Dropout Work-life-learn balance Attending classes
Irregular distribution of exams, accumulation of exams	Stress Postponing exams
Percentage of e-learning courses in face-to-face study programmes	Work-life-learn balance

Concerning the amount of *elective courses*, there is almost no empirical evidence to be found. Only BLÜTHMANN, THIEL & WOLFGAMM (2011) see a very low percentage of electives as one of the reasons for dropout. Furthermore, a flexible timetable that allows students to choose between different subjects or different times for the same subject (e.g. weekly or blocked) is helpful for students with time restrictions. Lacking choices between different classes can deteriorate the work-life-learn balance and make it more difficult to attend all classes (HUSEMANN & MÜLLER, 2018).



Regarding the distribution of exams within one semester, there is some evidence from workload studies. SCHULMEISTER & METZGER (2011) and KÖNIG & WANNEMACHER (2017) show that the accumulation of exams at the end of the semester leads to high stress amongst students. Furthermore, students' absence from courses increases when they have to learn for exams or tests in other courses (WESTRICK, HELMS, MCDONOUGH & BRELAND, 2009). As it is typical for the study programmes in this sample to place the examination period at the end of the semester (which therefore does not produce variance), I focus on the distribution of exams throughout the whole programme. I assume that a high variation in the number of exams per semester enhances stress, and leads students to postpone some of the exams.

There is a broad body of literature on the effects of e-learning on flexibility (for an overview, see TAMIM, BERNHARD, BOROKHOVSKI, ABRIMI & SCHMID, 2011). E- or blended learning is seen as an important structural element to enhance flexibility with regard to time, place and even content (KÖNIG & WANNEMACHER, 2017). This is especially the case for students with time restrictions, whose work-life-learn balance should improve when introducing well-supported online learning in traditional face-to-face study programmes (ALLAN, 2007; HALL, 2010; KUNADT, SCHELLING, BRODESSER & SAMJESKE, 2014). More critical aspects, such as high dropout rates, mainly concern distance education (MORGAN & TAM, 1999).

## **4 Data and Methodology**

The sample includes students from the Ludwigshafen University of Business and Society (N = 980, response rate 68%) and the University of Applied Sciences Worms (N = 272, response rate 10%), who completed a questionnaire on their personal situation and study conditions in the months of November and December 2015. The students from Ludwigshafen completed the questionnaire during face-to-face lessons, whereas students from the city of Worms completed it online. The composition of the sample largely corresponds to the demographic characteristics

of the student bodies and other nationwide surveys. Out of all participants, 687 students answered that they worked, 49 had children, 51 had care responsibilities and 71 were disabled. For a detailed description of the sample, see BUSS (2019, 115 f.). Students in part-time and MBA-Programmes were not part of the sample.

Beside the survey data, a document analysis (BUSS, MÜLLER & HUSEMANN, 2015) provided information about the structure of study programmes. Study programmes were analysed if more than 12 students answered the questionnaire (N = 29).

Only those study structures were included in the document analysis which could be identified at the programme level. Four selected structural variables influence the flexibility of study programmes, as follows. The first variable is the *average number of teaching hours per week* (0 = up to 20 teaching hours, 1 = 21 teaching hours and more), as a small number of teaching hours per week allows high flexibility to students with time restrictions. In addition, a high number of teaching hours reduces the time available for self-study. Second, *elective courses* give students the flexibility to choose between several courses in terms of time and content, and could therefore reduce the difficulties in attending courses (0 = more than 10%, 1 = 10% or less electives). Third, a *regular distribution of exams throughout the semesters* can support continuous learning processes and reduce peaks of stress, during which students have to decide between the preparation for exams and attending courses (0 = same number of exams per semester, 1 = more than two exams variance). Another aspect examined was the extent to which *classroom teaching is replaced by e-learning*. However, as the study programmes showed hardly any variance, e-learning could not be included in the analysis. In order to ensure objectivity, two members of the project called *Open Study Model Ludwigshafen* carried out the categorization independently. If there were deviations in the assessments, these were checked by a third person.

The data were analysed by conducting Structural Equation Modelling (SEM) using STATA 14. The model replicates the relevant part of the model *structural Studierbarkeit*. The variables describing students' obligations and their situation are

dummy variables (0 = no, 1 = yes), except *employment\_kat* (employment during term in categories of 5-hour periods). The latent variable *Fit\_structure* is measured by three observed variables, describing (1) problems in spending self-learning time or (2) in attending courses regularly because of private obligations, and (3) an overlap between courses and obligations in general. The latent variable *Satisfaction* is based on a scale by WESTERMANN (2010) for studying conditions (e.g. better study conditions, little focus on students' needs, frustrating circumstances). All these observed variables (including *postpone\_exams*) are measured on a 5-point Likert scale. As the residuals of the variable *postpone\_exams* do not show a normal distribution, the estimation uses the robust maximum-likelihood method and displays standardized coefficients. Only statistically significant correlations (<0.05) are shown in figure 2.

## 5 Results

The Structural Equation Model has a good model fit (CRMR = 0.038).<sup>2</sup> The SEM shown in graph 2 shows that having problems in study behaviour (in attending classes, self-learning, work-life-learn balance) loads strongly on the latent construct of *Fit between students' needs and study programme structures*. Higher employment hours, care responsibilities and disabilities are related to this fit.

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<sup>2</sup> When conducting the same model as a usual ML estimation, coefficients and significance change only slightly. Fit statistics then are: RMSEA: 0.048, CFI: 0.937.

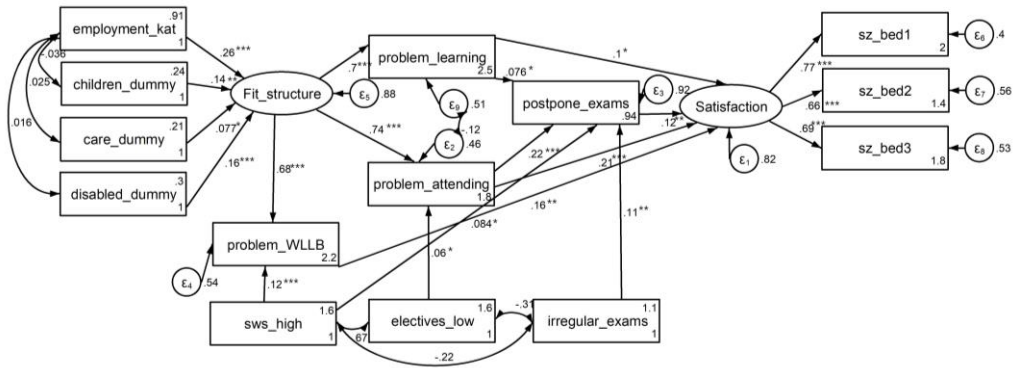


Figure 2: SEM-Model using robust maximum likelihood estimation, modelfit CRMR = 0,038, CD = 0,167. N = 798. Confidence level: 0.95.

Having problems attending classes and finding time for self-learning are significantly related to postponing exams, and therefore to studying longer.

Concerning Hypothesis 1, the fit between students’ needs and universities’ offers is better, if study programme structures are more flexible. The results show small but significant correlations between high teaching hours per week and low perceived work-life-learn balance. Furthermore, teaching hours and the duration of studies (as measured by postponed exams) are positively correlated. As the missing arrow in figure 2 shows, there is no significant correlation between teaching hours and self-learning time.<sup>3</sup> These and the following results are summarized in table 2.

A low percentage of elective courses correlates with students’ problems in attending courses. The literature assumes a relationship between the amount of elective courses and work-life-learn balance; however, this cannot be confirmed by the results. The same can be said about the correlation between low flexibility through

<sup>3</sup> A table with all variables, coefficients and significances can be found here: <https://www.zfhe.at/index.php/zfhe/article/view/1229/867>

lack of electives and dropout; this relationship was tested using the variable *I seriously consider ending my studies*. As the correlation coefficient was small and not significant, it is not shown in the graph.

As for the last structural variable, the SEM tests the correlation between an irregular distribution of exams and the behaviour of students to postpone exams. This variable is used as a proxy for the duration of study. The correlation is significant, and shows that a regular distribution of workload is important.

Table 2: Test of Hypothesis

<i>Structural element</i>	<i>Is related to...</i>	<i>Test of hypothesis</i>
Teaching hours per week	Self-learning time	No evidence
	Work-life-learn balance	Evidence
	Duration of 0study	Evidence (postponing exams)
Percentage of elective courses per study programme	Attending classes	Evidence
	Dropout	No evidence
	Work-life-learn balance	No evidence
Irregular distribution of exams	Stress	Not included in the analysis
	Postpone exams	Evidence

Concerning Hypothesis 2, the correlation is tested between student satisfaction and the fit they expressed by describing their problems with their study behaviour. The scientific literature suggests that high satisfaction is a result of an excellent person-environment fit. The SEM shows a link between student behaviour – connected to study structure and individual characteristics of students – and *satisfaction with the studying conditions*. Students with difficulties in attending classes, in finding time for self-learning, or who postpone their exams, are significantly less satisfied with the conditions in their study programme. Therefore, the flexibility in the observed study programmes does not yet satisfy the needs of a diverse student body.

## 6 Conclusions

This article shows the relevance of flexible study structures when universities are aiming to secure a high structural *Studierbarkeit* for their programmes. Study programme structures such as adequate teaching hours per week, many elective courses, or an even distribution of exams, allow working students, students with care responsibilities, or disabled students, to study at their own speed, attend the courses they want, and devote enough time to self-learning. Flexibility gives them the possibility of studying as much as they can, and of choosing the time and place of studying according to their own needs. The question poses itself, if different groups within the student body need different forms of flexibility. In order to answer this question I compare the four student groups integrated in the SEM using an index of the three variables building the latent construct *fit\_structures*.<sup>4</sup> The results show, that especially care responsibilities, children, disabilities and working more than 20 hours per week lead to difficulties in study behavior and make changes of programme structures especially urgent. How these differences affect students' preferences concerning the design of study programmes is analyzed in BUß (2019, p. 153 ff.).

Overall, designing flexible study programmes is an important strategy in creating a high structural *Studierbarkeit* for a diverse student body. But by doing so, the students need *self-learning competences* to cope with this flexibility (RÖBKEN, 2012; WICHELHAUS, SCHÜLER, RAMM & MORISSE, 2008). Universities should take this into account when designing their study programme structures, and provide counselling and good orientation.

There are, however, some limitations to this study. First, the data represents two Universities of Applied Sciences in Germany, with a focus on Business Administration, Computer Science, Social Work and Nursing Science. To create more

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<sup>4</sup> Coefficients and significances can be found here:  
<https://www.zfhe.at/index.php/zfhe/article/view/1229/867>

variance between study conditions and structures, it would be interesting to extend data collection to universities with other disciplines in a wider geographical area. Second, due to missing variance, it was not possible to compare the analysed effects to the effects of e-learning. Therefore, further research should address this comparison, in order to understand how e-learning can contribute to more flexible study programmes.

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