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Study success – A multilayer concept put under the microscope

Abstract

In the ongoing debate about “Studierbarkeit”, the individual study process offers a promising starting point for institutional attempts to support study success. After briefly introducing established theoretical perspectives and empirical findings on the prediction of study success, I will argue for a closer alignment of research on and practical implementations of student support. Furthermore, I will present a process model of the – most critical – first year of study and demonstrate its fit using data from three cohorts. The practical implications derived from this model, as well as some strategic recommendations for how higher education institutions can foster study success are outlined.

Keywords

dropout, process model, study success

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1 Introduction

The promotion of study success – as opposed to student dropout – has been acknowledged as an important responsibility of higher education institutions (HEI) since the Bologna Declaration (1999) and the following reforms. The demand for “Studierbarkeit” has led to a more in-depth discussion about how “study success” (KREMPKOW, 2009) should be defined and measured, as well as the identification of reasonable starting points for institutional attempts to fulfill their responsibilities.

At the upmost coarse-grained level, “study success” could be defined as graduation. Thus, the OECD uses this definition with an additional time specification. For example, completion rates within the theoretical duration of the program (plus three years) have recently been reported (OECD, 2019). Expanding on this definition, dropout can be defined as ultimately leaving HEI without graduation, and study success and dropout can therefore be seen as the opposite of each other.

Dropout in higher education is a widespread phenomenon: About one in three students in the OECD countries drops out (OECD, 2019), and European education policy has become more aware of this phenomenon in recent years (THOMAS & HOVDHAUGEN, 2014; VOSSENSTEYN et al., 2015). Official statistics show that the first year of study is most critical: The majority of students who drop out do so in the first year (HEUBLEIN, RICHTER & SCHMELZER, 2020). The paper at hand therefore focuses on this phase of academic life.

As dropout is costly from different perspectives (KREMPKOW, 2005; THOMAS & HOVDHAUGEN, 2014), numerous stakeholders have long been interested in identifying students likely to drop out early, so as to be able to offer them prophylactically educational counselling (ISLEIB, 2015). However, empirical findings about the factors contributing to success versus dropout do not appear to be pathbreaking for institutional interventions. The discrepancy between scientific insights gained in the field of higher education research and counseling practices calls for a closer alignment between these two areas (PETRI, 2021).

2 Background

2.1 Study success versus dropout

On a more fine-grained level, various definitions of study success can be used. A more gradual assessment can be made by defining it as “good grades”. As TRAPMANN et al. (2007) reported, the grade point average (GPA) has been the most frequently used operationalization. Apart from these objective criteria (graduation, GPA), subjective criteria are also used. For Germany in particular, HEUBLEIN et al. (2015) surveyed members of 231 HEI on how they define study success. They listed student satisfaction as well as the acquisition of subject-specific skills and knowledge and – to some extent more situated at the meso level – high average GPA and low dropout rates. Complementing that, BOSSE & MERGNER (2019) surveyed students and found that, beyond the notion of satisfaction, maintaining or increasing their interest in their study subjects and an acceptable level of (i. e., not excessive) stress are also relevant factors.

2.2 “Studierbarkeit” and study success

“Studierbarkeit describes whether a study program 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.” (BUSS, 2019, p. 306).

Based on the aforementioned possible definitions of study success, one could have some operationalizations in mind for “learning outcomes”. The outlined definitions of study success can be directly transferred into desired outcomes: skill acquisition, student satisfaction, interest in the subject matter, absence of (excessive) stress.

To further relate “Studierbarkeit” to study success, we should look at factors contributing to the latter. In this, a differentiation between aspects pertaining to the meso level (What can HEI do?) and those pertaining to the micro level (Which factors lie within the individual student?) is widely accepted (BUSS, 2019).

The structural aspects of “Studierbarkeit” for example clearly refer to the HEI’s sphere of influence. Some other aspects – at first sight mainly located at the micro

level – can be the target of institutional approaches to create good study conditions too. This is in line with the notion of “Studierbarkeit” as the absence of hindrance factors for study success (RICHTER, 2000, cited according to KREMPKOW, 2009). Moreover, we can assume that the “subjective” criteria of study success (e. g., satisfaction) are mostly antecedents of “objective” criteria (e. g., GPA or graduation) which can finally be extracted from official records/administrative data.

To provide students with a learning environment that fosters success and inhibits hindrance factors, we clearly need a thorough understanding of the (micro level) process leading to study success versus dropout. Building on that, HEI could be directed towards the relevant variables that guide strategical resource allocation, e. g., in terms of student counseling. In particular, an evidence-based support system tailored to students’ needs may be the key for institutional attempts to support the individual student’s path to “adequate learning outcomes” (BUSS, 2019, p. 306) and can consequently be seen as one way to take on responsibility for “Studierbarkeit”.

2.3 Predicting study success versus dropout

In the course of time, we have witnessed a growing body of research – mainly pertaining to the individual level – on the prediction of study success in its various forms (and operationalizations). Overall, this can be clustered into findings about single predictors on the one hand and models of study success on the other hand.

For the first, there is wealth of literature on predicting study success. Meta-analytic results mainly, but not only, emphasize factors inherent in the individual. In sum, cognitive predictors of study success as well as socioeconomic status, self-efficacy, goal-setting, social integration and (the absence of) stress are named (RICHARDSON, ABRAHAM & BOND, 2012; ROBBINS et al., 2004; SCHNEIDER & PRECKEL, 2017).

A more holistic view of the phenomenon study success goes beyond single predictors and aims at modelling the fundamental process. Several models have been postulated so far. Many of them strive to explain processes that take place within the individual and lead to (successful) outcomes. While different disciplines involved in higher education research applied “their” characteristic perspectives, we still need a broader perspective that integrates different disciplinary foci.

Furthermore, although most of the existing models are well-elaborated on the theoretical level, their empirical validation lags behind. This is, however, especially problematic as we cannot assume that models originally postulated some decades ago (e. g.; SPADY, 1971; TINTO, 1975) for a student population within one specific (national) education system fit for a different educational system nowadays. To express a recommendation: Institutional attempts to ensure “Studierbarkeit” and to support desirable “learning outcomes” should be strategically allocated within a broader framework based on scientific findings on study success and dropout. In this regard, an empirically validated model can serve as a roadmap for allocating (limited) counseling resources.

2.4 Intended Contribution

This paper seeks to contribute to the ongoing debate about “Studierbarkeit” and study success in two ways: First, I will build on what we know so far about the individual study process – on a theoretical level –, in particular about the first year of study. I will outline an integrative process model that could inform and guide institutional policies tailored to freshmen’s needs. Second, I will present the empirical validation of this model by demonstrating its fit to data from three cohorts of freshmen.

2.5 The Experience-Oriented Study Entrance Model

In the following, an integrative process model of the first study year will be described. In view of this paper’s space limitations, I refer to other sources² for a detailed explanation of the model construction. To keep it concise, I will sum up the rationales that guided the conceptualization: Reviewing the literature on models of study success versus dropout, it became apparent that the established approaches mainly share their focus on the micro level but differ in their theoretical background. Various global theoretical frameworks are used. But we are still in need of

2 Please note that model construction and validation have been part of a completed dissertation project (PETRI, 2021). Its link to the ongoing debate about “Studierbarkeit” has not been published before.

an integration of different perspectives into one model. Furthermore, as some of the well-established models were postulated decades ago, we should examine if they still fit today's educational contexts and if recent meta-analytic findings on (single predictors of) study success, are adequately represented in these models.

As an attempt to do so, I conceptualized the EOS model: The experience-oriented study entrance model. In concrete terms, I referred to:

1. Research deriving from the fields of educational or social sciences often encompassing a focus on social interaction aspects (models by SPADY, 1971 and TINTO, 1975).
2. In addition, psychological frameworks like the theory of planned behavior as well as the expectancy-value paradigm (BEHR et al., 2020): I opted for an expectancy-value approach by NEUVILLE et al. (2007).
3. Last but not least, I considered the social-cognitive perspective by taking the Social Cognitive Career Theory (SCCT; LENT & BROWN, 2013) into account. It was not originally postulated as a model for study success, but as a framework for modelling how people act when adapting to new career environments, I transferred the SCCT to the higher education context. In particular, it was applied to the first year of study as it is such a highly challenging phase.

After reviewing the above-mentioned models, I merged them into an integrative model, representing the core elements of each. Finally, I made sure that the main findings from the meta-analyses are included.

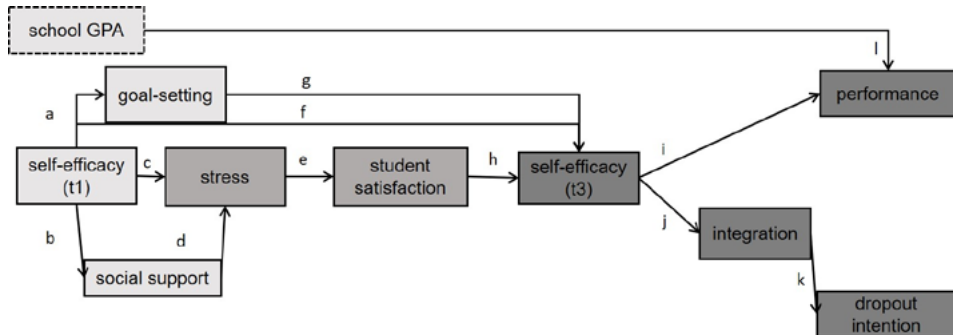


Figure 1: The experience-oriented study entrance model

The EOS model (Figure 1) is to be “read” from the left to the right as a timeline. The process starts with a certain level of context-specific self-efficacy when entering higher education. The higher the level of self-efficacy at the beginning of the first year, the higher (i. e., more challenging) are the goals students set themselves (path a; LENT & BROWN, 2013). Moreover, the higher the level of self-efficacy, the more social support students perceive and the less stress they experience (path c, b, and d; AHMED et al., 2010; COHEN, KAMARCK & MERMELSTEIN, 1983; PEKRUN, 2006; ROBBINS et al., 2004). Building on the work by NEUVILLE et al. (2007), I decided to emphasize the importance of self-efficacy as a predictor and included it twice in the model. This way, the model’s process character is underlined and the dynamics inherent to the construct self-efficacy (the ongoing shape based on our experiences) is reflected: The level of self-efficacy at the beginning of the first year of study is positively associated with the level of self-efficacy later in the process (path f; PETRI & BRAUN, in press) which is associated with goal-setting as well (path g; LENT & BROWN, 2013). Furthermore, the less stress students experience, the higher their satisfaction (path e; AHMED et al., 2010) which is associated with self-efficacy later in the process. The latter level of self-efficacy in turn is a central predictor of the integration into the HEI which is in turn directly associated with dropout intentions (path h, j and k; BEHR et al., 2020; SPADY,

1971; TINTO, 1975). Performance in higher education is inherently associated with self-efficacy (path i) apart from its well-known association with high school GPA (path l; TRAPMANN et al., 2007).

Intending to empirically validate the model, it was conceptualized so as to span the whole first year of study. As indicated by the three shades of grey in Figure 1, possible time points for the assessment of the respective variables were kept in mind: beginning of the first semester (light grey), end of the first semester (medium grey) and end of the second semester (dark grey).

3 Method

3.1 Data collection

Data was collected from three cohorts of freshmen in a row, starting in winter 2016/2017. Each cohort was sampled at the beginning (t1) and the end of the first semester (t2) and at the end of the second semester (t3). Over the course of the study (nine months), panel attrition was registered: In each cohort, I observed approximately 50 percent attrition from t1 to t3 which is comparable to other longitudinal studies (EHLERT et al., 2017) and a well-known phenomenon when studying drop-out (NEUGEBAUER, HEUBLEIN & DANIEL, 2019).

For all three cohorts, the study design was the same so that cohort II and III served as replications. For the respective initial assessment (t1), participants were recruited with flyers, via email as well as via calls for participants in social networks. After initial recruiting, only those participating at the first point of measurement were invited by email to participate further. At every point of measurement, participants filled in an online questionnaire (15 to 20 minutes). As an incentive, they could take part in a lottery for online shopping vouchers.

3.2 Sample

Inclusion criteria were *i*) participation at t3 (but not necessarily at t2) and *ii*) reports on the two most important criterion variables: HE performance and intentions to drop out. Following this rationale, 6 (cohort I), 29 (cohort II) and 26 (cohort III) cases were excluded to fix the final samples used for analyses. Although the relative portion of this so-called listwise deletion is above what is recommended (LÜDTKE et al., 2007), I decided to do so and not to impute missing data for these two criteria. Apart from that, if applicable, the Full Information Maximum Likelihood estimation was used.

In more detail, sampling started with $N_{t1\ cohort1} = 315$, $N_{t1\ cohort2} = 323$ and $N_{t1\ cohort3} = 462$ respectively at t1 and ended up with samples sizes of $N_{t3\ cohort1} = 145$, $N_{t3\ cohort2} = 119$ and $N_{t3\ cohort3} = 160$ respectively at t3 ($N_{total} = 424$). The samples drawn from the three cohorts were comparable concerning the average age as well as the distribution of gender and the fields of study (Table 1). Furthermore, comparing the starting samples with the final analyses samples for each cohort did not reveal any significant differences in terms of age and distribution of gender. This is also true for the distribution across fields of study in cohort II and III. Only in cohort I, did students enrolled in language, culture, and social sciences as well as in STEM drop out more often than those enrolled in pedagogy.

3.2 Instruments

To keep it concise, the instruments used to assess the respective variables and the observed reliabilities are presented in Table 2.

Table 1: Demography

Sample	gender (% female)	age (years)	study fields (%)				
			1	2	3	4	5
Cohort I (<i>N</i> = 145)	79.3	M = 20.3 (SD = 2.5)	19	29	14	30	8
Cohort II (<i>N</i> = 119)	82.4	M = 21.0 (SD = 4.4)	29	17	14	26	14
Cohort III (<i>N</i> = 160)	80.0	M = 20.7 (SD = 3.4)	17	27	13	12	31
Aggregated (<i>N</i> = 424)	80.4	M = 20.9 (SD = 3.8)	21	25	14	22	18

Note. Fields of study: 1 = STEM, 2 = medicine and psychology, 3 = language, culture, and social sciences, 4 = pedagogy, 5 = economics, law, and others.

Table 2: Instruments used (including means, standard deviations, and reliability)

construct	reference	no. items	M (SD) [Range]	Reliability (Cronbach's α)	example item
high school GPA	Self-made item	1	2.16 (0.62) [1-6]	-	Please give your high school grade point average.
goal-setting	Self-made items	13	3.94 (0.51) [1-5]	.82 - .83	Please rate how important it is for you to perform well even when facing time pressure.
self-efficacy (t1)	(PETRI, 2020)	13	3.62 (0.47) [1-5]	.80 - .91	Please rate how confident you are that you will be able to organize your schedules on your own.
self-efficacy (t3)	(PETRI, 2020)	13	3.78 (0.52) [1-5]	.80 - .91	see above
social support	SCHULZ & SCHWARZER (2003)	8	3.57 (0.57) [1-4]	.92 - .94	When I am worried, there is someone who helps me.
stress	KLEIN et al. (2016) (subscale)	6	2.08 (0.71) [1-5]	.77 - .82	In the last month, how often did you feel that you could not cope with all the things that you had to do?
satisfaction	HIEMISCH, WESTERMANN & MICHAEL (2005) (subscale)	3	3.42 (0.94) [1-5]	.81 - .82	I often feel tired and exhausted because of my studies.
integration	GEHRING (2006)	27	4.01 (0.54) [1-6]	.80 - .84	I try to keep updated concerning institutional policies.
performance	Self-made items	1	9.96 (2.85) [1-15]	-	Please give your current grade point average.
intentions to drop out	RESPONDEK et al. (2017) (adapted)	2	2.87 (1.83) [1-7]	-	I plan to leave university permanently.

Note. Aggregated sample, $N = 400-424$. For descriptive purposes, one item per construct was translated into English. In the studies, all items were administered in German.

3.4 Analyses

I decided to examine the EOS model as a path model: “Path analysis is an extension of multiple regression. It goes beyond regression in that it allows for the analysis of more complicated models. In particular, it can examine situations in which there are several final dependent variables and those in which there are ‘chains’ of influence, in that variable A influences variable B, which in turn affects variable C.” (STREINER, 2005, p. 115). In more detail, the EOS model was operationalized with mean scores for every (manifest) variable.

An important requirement must be fulfilled (and therefore analyzed) in order to propose the EOS model as a framework for counseling and the promotion of “Studierbarkeit”: Going beyond the empirical validation with one sample, it is important to prove its empirical fit for different cohorts as an indicator for generalizability.

3.4.1 Software

For data preparation purposes and the matching between the respective three points of measurement SPSS 21 (IBM CORP, 2012) was used. The model fit analyses were performed using RStudio Version 1.4.1103 (lavaan by ROSSEEL, 2012).

4 Results

4.1 Model fit

As a first step, I conducted model fit analyses for each cohort of freshmen separately (Table 3). Although the model fit indices differ slightly across the cohorts, the fit is at least acceptable or even good for every cohort, according to well-established cut-offs (HU & BENTLER, 1999). In a second step, I calculated model fit for the aggregated sample. Table 3 displays χ^2 (in order to provide an comprehensive overview, but not as an indicator of fit; KLINE, 2015), CFI (should be $\geq .95$), RMSEA (should be $\leq .06$) and SRMR (should be $\leq .08$). Figure 2 shows the EOS model with standardized path coefficients. All paths but the one from school GPA to performance as well as from goal-setting to self-efficacy (t3) revealed significance.

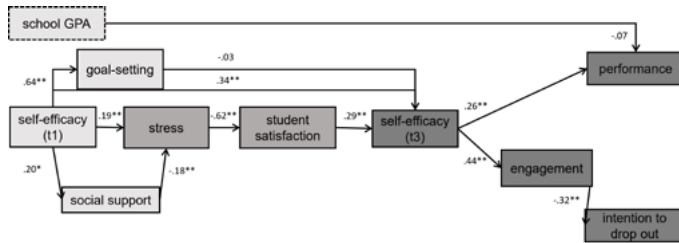


Figure 2: The EOS model (standardized path coefficients, $N = 424$, $p < .05$, $p < .01$).

Table 3: Model fit per cohort and for the aggregated sample

Cohort	χ^2 (df)	CFI	RMSEA [CI _{90%}]	SRMR
Cohort I ($N = 145$)	33.81 (31)	.99	.03 [.00;.07]	.05
Cohort II ($N = 119$)	50.31 (31)	.93	.07 [.03;.11]	.08
Cohort III ($N = 160$)	53.56 (31)	.95	.07 [.04;.10]	.07
Aggregated ($N = 424$)	64.37 (31)	.95	.05 [.04;.07]	.06

5 Discussion

5.1 Summary

The present paper sought to contribute to the ongoing discussion about study success and “Studierbarkeit” in two ways. First, a theoretical level discussion attempted to demonstrate why institutional attempts to retain “Studierbarkeit” (i. e., to foster study success) should be based on empirically validated models hereof. Second, I presented the EOS model as one possible model. Based on its integrative conceptualization, it comprises different established models and includes the most promising single predictors of study success according to recent meta-analyses.

Second, I reported the results of the EOS model’s empirical validation. Its satisfying empirical fit suggests that it be used as a framework for planning and evaluating student counselling at HEI in Germany: Highlighting the variables that are key for a successful first year in HE, the EOS model can serve as a roadmap for strategical resource allocation in order to provide freshmen tailored support as one way of means retaining “Studierbarkeit”.

5.2 Strengths and Limitations

Seeking to conceptualize a model that can be tested empirically using longitudinal data without going beyond any realistic study design scenario, the EOS model is comparably parsimony. As such, it is – as models always are – intended to scratch a certain excerpt of “reality”. Therefore, extensions (additional paths) of the EOS model are conceivable. Also, taking additional perspectives into account can be a possible next step (e. g. the rational choice theory; BEHLEN et al., 2021).

From the assessment perspective, one could criticize that only self-report data was used. Also, dropout intentions as a proxy for dropout were assessed. While this is common practice (NEUGEBAUER, HEUBLEIN & DANIEL, 2019), validation of the model with data from other sources is desirable.

Deliberating whether to use one of the valuable large-scale datasets available for secondary use or to collect data on my own, I decided on the latter, since prominent

data sets I screened were either cross-sectional or the assessment frequency was too low for fitting a path model spanning ‘only’ the first year of study. Summing it up, the study reported here provides psychometrically high-quality data (i. e., reliable and detailed measurement instruments) drawn longitudinally from the target population. However, I observed severe attrition rates. While this is common to some degree (EHLERT et al., 2017; TIEBEN, 2019) it is nonetheless problematic as it could lead to a bias: It is plausible that students likely to drop their HE studies are also likely to drop out in longitudinal research on study success.

Data from the 21th Social Survey were used – not for the study at hand, but in a consecutive step – in order to empirically validate the EOS model in terms of regression analyses with a larger sample and other operationalizations of the respective variables (PETRI, 2021).

5.3 Implications

Strategic plans and an evaluation of institutional interventions based on a broader understanding of the process of studying is recommended. The EOS model can serve as such a broader framework for the first year of study. In addition, permanent implementation of support structures as central elements to fulfill the HEI’s responsibility to foster “Studierbarkeit” by acknowledging the importance of (individual) experiences within the course of study appear to be the logical consequence (e. g., BRENSING et al., 2021; VETTORI & SCHWARZL, 2008).

In concrete terms, we can derive from the EOS model e. g., to foster freshmen’s self-efficacy right from the start and to help them in building up strong social support systems, probably by systematically initializing peer-support. Thus, evaluations of the proper interventions should assess whether participants of these interventions report higher levels of self-efficacy and social support as well as lower levels of stress than non-participants. Ideally, institutional support is embedded in continual monitoring and evaluation not only with “field data” but also with (quasi-) experimental designs.

5.4 Outlook

While the EOS model was presented as one model that is empirically validated with data from freshmen in Germany, derivations of it or other models (complementing models for the middle or the final phase of higher education studies) might come up in the future as the HE system might be subjected to further reforms and changes. Therefore, it is important to keep synchronizing higher education research and practice (e. g., higher education development) to provide “Studierbarkeit” and to keep (the process of) study success under the microscope.

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