Understanding the Impact of the Corona Pandemic on the Study Success at a German University

Christin Voigt[1] and Jonas Kötter[2]

Universität Osnabrück, Katharinenstraße 1-3, 49074 Osnabrück
[1] christin.voigt@uni-osnabrueck.de, [2] jonas.koetter@uni-osnabrueck.de

Abstract. The political measures to contain the Corona Pandemic have forced many universities to close their gates in the last summer semester of 2020 and change over to distance learning. As fast as this change had to be implemented, the long-term consequences are uncertain. To analyze the impact on the study success, this paper aims to provide a path diagram of different factors influencing study success at a German university. This research is built on a quantitative online survey, in which 1.529 students took part. The items of the survey are based on factors for which influences of the Corona Pandemic have already been identified in a holistic model for describing the study success. In the factor analysis, the relevance of the technology becomes apparent as it appears in almost all categories that influence the study's success. Besides, a new factor, an "adaption to digital teaching", shows a strong influence.

Keywords: Study Success, Corona Pandemic, Higher Education, Study Dropout.

1 Introduction

At the beginning of 2020, an unusual semester started at universities worldwide. As a result of the political measures to contain the Corona Pandemic, many German university gates remained closed. This forced the heads of the universities, teachers, and scientific staff to offer alternative course concepts, where teaching was continued from outside the university. As a result, the use of digital learning technologies increased rapidly and replaced traditional classroom concepts. Many German universities changed over to teaching exclusively online. However, while higher education policy focused on compliance with the measures and forced the universities to act quickly, in many places, the long-term consequences of the rapid change to online teaching cannot be thought through. Experience has shown that implemented changes at this rapid pace cause some complications, such as acceptance issues among the stakeholders involved [1]. It is still unclear, what the long-term consequences of a rapid shift to Distance Learning might be. The study's success was investigated before the outbreak of the Corona Pandemic and could be quantified by adherence to the planned study plan in terms of adherence to the standard study period and a low tendency to discontinue the study [2–7]. In describing the factors that influence study success, previous research has considered initial conditions and long-term success, as well as financial situation, living conditions, advising and information, study and learning behaviors, integration, study conditions, and physical resources [2, 8–12]. However, it is still uncertain, how

these factors influence each other during the Corona Pandemic and what effects on the study success are to be expected. Thus, the research question of this paper (RQ) is:

RQ: *How can study success at a German university at the time of Corona Pandemic be explained using a path diagram?*

To answer the **RQ**, we first determine which factors, based on previous research, influence university study success. A holistic model is identified through a literature review, which shows all factors influencing the study success that are considered relevant before the Corona Pandemic. Since this research examines the actual status of already enrolled students, only the current semester ‘s factors are considered. An investigation was also carried out to determine, which influences of the research model are expected to have an impact of the Corona Pandemic according to current research. These findings formed the basis for a quantitative survey that was completed by 1.529 students at a German university.

Based on this analysis, the influences, according to universities’ closure, are tested and analysed using a path diagram. This model aims to understand the impacts of all factors. Besides, the results can be used for recommendations for action in higher education policy to promote study success in the long-term. The theoretical framework including the literature reviews is explained in Section 2, whereupon Section 3 addresses the analysis, including the hypotheses, the data collection, and the reliability and factor analysis results, as well as the path diagram. In Section 4, possible recommendations for German universities’ actions are discussed, whereupon the research is concluded in Section 5.

2 Theoretical Framework

For a consistent definition, the term "study success" will be described in more detail. In previous research, the quantification of study success has been based on various gelling conditions. We based our measurement on the three important and frequently used items to measure study success. The traditional items used to determine study success include: Study grade, study completion or dropout, and study duration [13]. Since the survey was conducted at the beginning of the first digital semester, it was not possible to measure the study grade under Corona conditions so far. In addition to study grades, dropout can be used to analyze study success. However, dropping out of a study program does not only become apparent by de-registration. Instead, it is based on a longer process referred to as the tendency to drop out of university. The duration of studies as a criterion for study success is based on a fixed plan in which the studies are completed. A deviation from this plan can be seen as a failure of study success [2, 5]. For further analysis, we define the study success as a low tendency to drop out, expressed by adherence to the study plan. This adherence consists of the adherence to short-term goals (completing courses according to plan) and long-term goals (no unscheduled extension of the study program). Moreover, a prerequisite for study success during the Corona Pandemic is studying under the current circumstances.

In the following, two literature reviews were conducted according to Schryen [14]. The first literature review generally identifies valid models for measuring the study success and to transfer all the influences shown into one research model. As this research model aims to show the direct impact of the Corona Pandemic, it does not consider upstream factors such as schooling or educational attainment before entering university, whose effects on study success at universities cannot yet be examined at this point in time. However, previous knowledge from school may impact the intention to drop out as one component of study success [15]. Similarly, at this point, no effects of long-term factors on the study success can be considered, as the Corona Pandemic has not existed for long enough. Instead, a status quo of the current effects of the Corona Pandemic on study success will be investigated. After the model has been determined, all influencing factors are examined concerning their relation to the Corona Pandemic by analysing previous research results about these influencing factors in a second literature review.

2.1 Study Success

Since the Corona Pandemic and the associated closures of universities are still a fairly new scenario, there are unfortunately no holistic models existing that specifically consider the pandemic's effects on the study success. Therefore, the research on study success before Corona Pandemic was analysed first. The focus of the first literature review was on metastudies that are not limited to one study program. It was carried out in two languages. As shown in Figure 1, the literature review was conducted in 3 steps: In the first step, all sources which were not written in English or German, all duplicate, or sources that were not available, were sorted out. In the second step, the articles were scanned, and the abstracts are analysed. Only scientific publications are further considered, as well as sources that focus on the study success or failure. Resources that specifically investigate only one influencing factor or have a deviating definition of study success were excluded. In the last step, further sources were excluded, which deal only with a study program or regard the time exclusively before the study. Finally, the sources were examined to determine whether a holistic model of influence was set up that also points to the effects out. A total of six models remain, which explain the study success holistically.

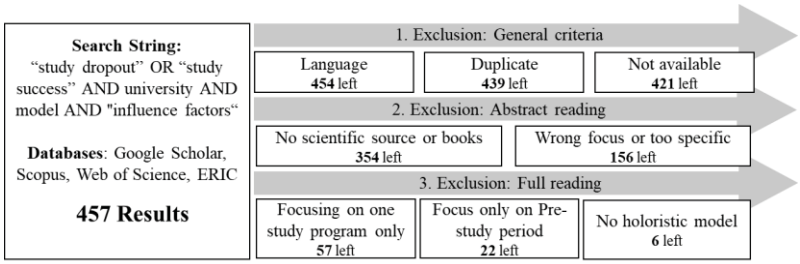

Fig. 1. Search Process 1.

According to Heublein et al., drop-outs as a negative study success are due to several factors resulting from a long-term process. In the so-called pre-study phase, conditions of origin, study prerequisites, and study choice or entry into the study program influence the decision. Moreover, in the current study situation, an interaction of performance, mental and physical resources, integration, study conditions, and study

motivation are decisive for discontinuation. Also, the decision situation, which can be defined as a decision for or against the abort and depends on the financial situation, the living conditions, the consultation, and plans, is significant over whether the abort is accomplished or not [10, 11]. In contrast, Blüthmann et al. describe entry requirements and the study conditions and contextual conditions that affect study and learning behavior. This study and learning behavior, in turn, affects the study success. Study success is seen as study satisfaction, professional and career-relevant knowledge, studying according to plan, and dropping out rate [9]. In a further study, the authors perform a structural equation model that explains the effects of drop-out tendencies. Central to this are the study conditions that affect the tendency to drop out ($\beta = -0.26$). They assume that study conditions affect the social climate, the quality of teaching, support and supervision, the content, the organization, and the drop-out tendency. On the other hand, the study conditions are influenced by learning speed, illness, lack of information, and the social climate. They also take account of family and work-related stress [16]. In [8] study success is defined mainly as study satisfaction and the acquisition of expertise influenced by the study conditions, the learning process and study behavior, the living conditions, and the entry requirements. Entrance requirements, study conditions, and living conditions also affect study and learning behavior.

Moreover, Heublein et al. consider the drop-out as a study success influenced by the pre-study phase, socio-temporal and structural characteristics, and the study situation. The study situation comprises the individual study process and internal and external factors [12, 17]. In contrast, Bornkessel divides all influencing factors into study entry requirements, study-related, institutional characteristics, and study-related, individual characteristics. These affect the study success in different ways, which harm the intention to drop out of the program via study satisfaction. In his work, he finds out a division of integration into teaching and studying. Important for integration with teachers is fair treatment, recognition, interest, and accommodation, while integration with students involves communication and professional exchange [2].

Figure 2 summarizes all observed relationships of these models. As mentioned above, only the active study period was considered, which is directly affected by the universities' closures. The pre-study phase, which was excluded, for example involves school education, social background, or choice of study. Long-term factors such as career prospects or plans are also excluded due to the lack of time and experience with the consequences of the Corona Pandemic. *Physical resources*, *conditions of study*, *integration*, *consulting and information*, *study and learning behavior*, *living conditions*, and *financial situation* are treated as latent exogenous variables. Researches on *physical resources* before Corona Pandemic include the available resources of both the students and the university. In some studies, mental resources are also equated with mental resources such as self-esteem, which, however, are counted as study and learning behavior in Figure 2 [8–10, 12]. The research on the *conditions of study* contain the institutional conditions, the quality of teaching, the difficulty and scope, the structure, the study climate, the teaching quality, and the study and examination situation, the course size, the content, and the organization of the study [2, 8–10, 12].

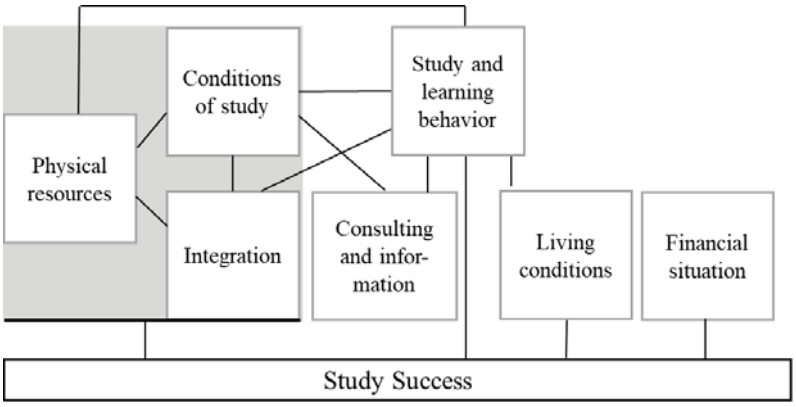

Fig. 2. Research Model.

Integration, on the other hand, is made up of social and academic integration and therefore also includes a negative social learning climate [2, 9, 16, 17]. These three factors (*Mental and physical resources, Conditions of study, Integration*) interact with each other and have an effect on the study success. The *study and learning behavior,* in contrast, describes the learning activities, learning strategies, learning speed, and learning behavior that result in learning success in previous research before Corona Pandemic. It also includes conceptual and vocational knowledge and learning difficulties [2, 9, 10, 12, 16]. The *consulting and information* includes accessing and support services within the university and from friends and fellow students [8, 9, 16]. In some of the research, *social integration* is seen as a part of *consulting and information*. Also, in some cases, the *living conditions* are referred to as context conditions. They contain the family, personal burdens such as illness or caring for relatives, the living situation or the time spent commuting [2, 8–10, 12, 16]. The *financial situation* can also be seen as part of the living conditions [9, 10]. It describes the financing of studies and the employment of students [9, 10, 12].

2.2 Study Success and Corona Pandemic

A second literature analysis examines, how and if Corona Pandemic affects the above-mentioned factors of study success or drop-out according to previous studies. This was carried out to include the changed circumstances. In a first search step, relevant contributions to the topic of study success in the Corona Pandemic period were searched for on Google Scholar, Scopus, Science Direct, Web of Science, and ERIC. This should serve to form our survey items according to the categories identified in Figure 2. In the period from 2019 until 2020, a total of 81 publications were identified. In a multi-stage process, publications were first removed that were not written in German or English, were listed twice, or were not available. In a second step, non-scientific sources and articles with a medical focus were removed. After 27 publications remained, these were read and analyzed in a full reading. Articles focusing other than study success and publications without Corona reference were excluded, so that seven publications remained. Figure 3 shows the process.

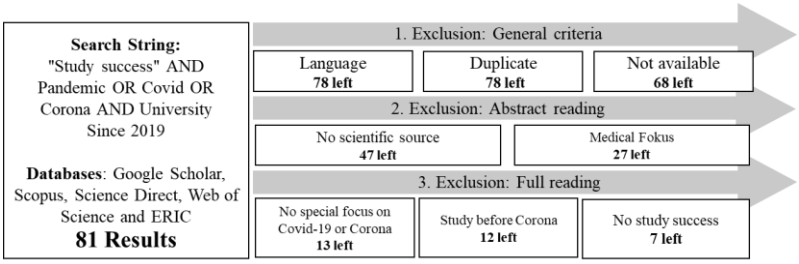

Fig. 3. Search Process 2.

Based on the identified seven publications, a concept matrix was established, shown in Table 1. In this concept matrix, the identified sources are assigned to the categories. Thereupon, the items formulated within the papers were assigned to the categories described in Figure 2 above. The analysed studies were based on different research designs. On the one hand, studies were considered in which qualitative interviews were conducted and on the other hand, statistical evaluations were analysed to measure the study success. The item according to the previous knowledge of the students was removed, as this item referred to specific professional contents of the course and not to the general study in times of Corona.

Table 1. Concept Matrix.

Source	Physical resources	Conditions of study	Integration	Study and learning behavior	Consulting and Information	Living conditions	Financial situation
[18]	X	X	X	X	X	X	X
[19]	X	X		X	X		
[20]	X	X			X	X	X
[21]		X	X				
[22]	X	X	X	X	X	X	
[23]			X				
[24]	X	X			X		

A total of 64 quantitative items were identified from the sources mentioned above. As shown in Table 1, most of the Corona Pandemic related studies consider the conditions of study. This is followed by physical resources, consulting and information and integration. Three of the seven publications also investigate the issues of study and learning behavior, living conditions. Moreover, two publications also examine the financial situation of students. The category of physical resources primarily includes the technical equipment of students, which consists of a laptop or desktop PC, a microphone and a camera, but also the software of the university [18–20, 22–24]. The category learning condition contains the inquiry of different learning materials, equal opportunities, and an efficiency estimate [18–20, 22–24]. Furthermore, researches during Corona Pandemic includes items about communication between students as well as academic integration and access to contents [18–20, 22–24]. Study and learning behavior includes workload and exam behavior [18–20, 22–24], whereupon consulting and

information considers items for advice and information from the university and between the students themselves [18–20, 22–24].

Beyond that, the category of living conditions includes employment, learning from home, and disruptive factors [18–20, 22–24]. Furthermore, the financial situation contains aspects about the changes within income and job losses [18–20, 22–24].

3 Quantitative Analysis

Based on the results of the literature review, a research model was presented in Figure 2, from which the following hypotheses (**H**) can be derived:

H01: The physical resources have an influence on the conditions of study.
H02: The physical resources have an influence on the integration.
H03: The physical resources have an influence on the study and learning behaviour.
H04: The physical resources have an influence on study success.
H05: The integration has an influence on the conditions of study.
H06: The integration has an influence on the study and learning behaviour.
H07: The integration has an influence on the study success.
H08: The conditions of study have an influence on study success.
H09: The conditions of study have an influence on the study and learning behaviour.
H10: The conditions of study have an influence on the consulting and information.
H11: The study and learning behaviour has an influence on integration.
H12: The study and learning behaviour has an influence on consulting and information**.**
H13: The study and learning behaviour has an influence on living conditions.
H14: The study and learning behaviour has an influence on study success.
H15: The living conditions have an influence on study success.
H16: The financial situation has an influence on study success.

To answer the hypotheses **H01**-**H16**, several items were developed based on Section 2.1 and 2.2 and sent to all students of a German university. 1.529 students of the university took part in the quantitative, voluntary, written, and anonymous survey. The analysis consists of a reliability and factor analysis and a path diagram based on linear regression and path analysis. SPSS Statistics was used for data cleansing, reliability, and factor analysis. The estimation of the path diagram was carried out with SPSS AMOS.

4 Results

The data were first subjected to a reliability analysis to verify the quality of the data. Table 2 shows the Cronbach's alpha of each item when removed from the survey, and

the corrected item-scale correlation. Table 1 also illustrates the original allocations of items before factor analysis. However, for reasons of simplification, the final item designations after factor analysis have been retained. The items' formulations can be seen in Table 3 below. Cronbach's Alpha before analysis is 0.702. By deleting X1, it could be increased to 0.722. X1 asked for how many courses the students have attended in the Corona semester and whether this is above or below average.

Table 2. Reliability Analysis.

Item	C-A* without Item	CISC*	Initial Factor	Item	C-A* without Item	CISC*	Initial Factor
A1	0.469	0.635	Study Conditions	H1	-0.076	0.668	Living Conditions
A2	0.504	0.627		H3	0.086	0.662	
D2	0.333	0.641		H2	-0.033	0.665	
D3	0.385	0.636		F1	-0.206	0.697	Financial situation
E1	0.210	0.655		F2	-0.251	0.693	
E2	0.302	0.645		J2	0.121	0.662	Physical resource
G1	0.288	0.646		J1	0.003	0.664	
G2	0.357	0.639		A3	0.462	0.634	
B1	0.547	0.627	Integration	I2	0.023	0.663	
B2	0.566	0.622		C2	-0.295	0.662	Study success
I1	0.341	0.644		C3	0.412	0.637	
K1	-0.001	0.665		C1	0.403	0.637	
A4	0.437	0.631	Information	D1	0.436	0.631	Study and learning behavior
K2	0.276	0.648		G3	0.475	0.647	
				X1	-0.042	0.722	

*C-A = Cronbach's Alpha, CISC = Corrected Item-Scale Correlation

In the next step, the data is subjected to factor analysis to verify and adjust the data classification to the categories formed. For the factor analysis, a varimax routing was carried out, and the extraction was based on the eigenvalue of 1. In addition, the Kaiser-Meyer-Measure test was conducted, which is acceptable with a value of 0.850. The significance, according to Barlet, is approximately 0.00. Screen plots were also used to determine the number of factors, and the rotated component matrix was analysed. A total of eleven factors were discovered. Table 3 also includes the item descriptions, the mean value, and the items' standard deviation for better comprehensibility.

The first factor combines all the items that measure *adaptation to digital teaching*. This includes the successful implementation of digital content and how this is achieved, both technologically and personally. The success model derived from theory did not include such a factor. Measured in terms of the items that define the content design and the study climate, *adaption to digital teaching* comes closest to the conditions of study, so its influences on the conditions of study, physical resources, integration, information, and study success are examined.

Table 3. Classification after Factor Analysis.

I*	Item in survey	M*	SD*	FA*
A1	The lecturers successfully manage the preparation and adaptation of teaching to the circumstances of the digital semester.	3.46	0.95	**A:** Conditions of study: Adaption to digital teaching
A2	The digital transfer of the contents is successful.	3.30	1.04	
A3	I am satisfied with the chosen video conferencing software.	4.03	0.96	
A4	Teachers pay sufficient attention to the special situations of students.	3.03	1.24	
B1	I consider several papers work to be a fair opportunity where equal opportunities are sufficiently guaranteed.	3.09	1.25	**B:** Social integration
B2	Communication with students by digital means is functioning.	4.33	1.06	
C1	I am sure that I will successfully complete the courses I have planned during this semester.	2.76	1.10	**C:** Study success
C2	I expect that the Corona Pandemic will extend the duration of my studies.	3.02	1.29	
C3	I believe that the realization of my studies is possible while Corona Pandemic.	3.51	1.04	
D1	I consider seminar presentations via video conference to be a fair way of conducting examinations where equal opportunities are sufficiently guaranteed.	3.28	1.26	**D:** Conditions of study: seminar
D2	I consider recorded seminar presentations to be a fair way of conducting examinations where equal opportunities are sufficiently guaranteed.	3.28	1.28	
D3	I consider oral examination via video conference to be a fair way of conducting examinations where equal opportunities are sufficiently guaranteed.	2.94	1.31	
E1	I consider online exams work to be a fair opportunity where equal opportunities are sufficiently guaranteed.	3.22	1.37	**E:** Conditions of study: Exam
E2	I rate online exams as appropriate based on the amount of work they require compared to the usual exam formats in previous semesters.	3.64	1.25	
F1	The Corona Pandemic has had a negative impact on my financial situation.	2.88	1.35	**F:** Financial situation
F2	I see my studies threatened by a change in my financial situation.	2.03	1.13	
G1	I consider several papers as appropriate based on the amount of work they require compared to the usual exam formats in previous semesters.	3.29	1.18	**G:** Study and learning behavior
G2	I judge weekly credit reports to be a fair way of ensuring that equal opportunities are sufficiently guaranteed.	3.32	1.25	
G3	My weekly working time that I have to spend on average per course has risen during Corona Pandemic.	2.36	2.12	
H1	There are factors in my home (children, parents, animals) that could prevent me from learning.	3.62	1.90	**H:** Living conditions
H2	I am more restricted than usual in my study activities by caring for relatives or looking after children due to the current situation.	1.80	1.60	
H3	I have a suitable room at my disposal, in which I can study undisturbed.	4.37	1.46	
I1	I have sufficient access to the content necessary for my courses.	3.03	1.24	**I:** Physical resource and academic integration
I2	I have a laptop or desktop PC that I can use.	4.53	1.28	
J1	I have a webcam that I can use.	4.94	0.48	**J:** Physical resource
J2	I have a microphone that I can use.	4.83	0.81	
K1	I have organized one or more (online) learning groups.	4.41	0.49	**K:** Information
K2	I feel sufficiently informed about conducting examinations during Corona Pandemic.	2.20	1.12	

* I=Item, M=Means, SD=Standard deviation, FA=Factor after factor analysis

The second factor *B* measures *social integration* in communication between students and perceived equal opportunities concerning paper works. These contexts could result from the fact that many paper works are performed in group work. Moreover, the item classifications of study success assumed before are confirmed by the factor analysis. Study success is composed of successful completion and the studies' perceived feasibility under the given circumstances. Besides *A*, the *adaption to digital teaching*, the *study conditions* are measured as testing modalities and are divided into seminar (*D*) and exam (*E*) conditions. Such a clear separation into types of examinations is not shown in the literature examined. In contrast, *F* considers the students' financial *situation* by recording the Corona Pandemic's effects on their financial circumstances. The *study and learning behavior* are measured by the weekly effort invested, and the assessment of tasks and paper works during the semester in terms of equal opportunities. The *living conditions* are composed of the available space and commitments or distracting factors due to the Corona Pandemic. The *physical resources*, on the other hand, are divided into two factors: Factor *J* includes the physical elements microphone and camera, while factor *I* contains a laptop or desktop PC's availability, as well as the access to the contents. These factors are also not found in the theory discussed above. Since face-to-face teaching can no longer be conducted at times of the Corona Pandemic, the laptop or desktop PC might be the prerequisite for accessing the teaching content. Thus, the factor *I* become a mix of physical resources and academic integration. Factor *J*, on the other hand, measures only the physical resources, microphones, and camera, while the factor *information* consists of whether students feel sufficiently informed and whether they have learned in one or more digital groups. These two items being part of one factor, could indicate that the information is also obtained through social channels. This means that it is not only the university's institutions that are important for *information*.

Following the reliability and factor analysis, the determined factors are subjected to a path diagram, highlighting the parameters of factor analysis (λ) and the relationships between the factors based on maximum likelihood estimator (MSE) of covariances (ϕ). The result of this analysis is summarized in Figure 4. The items are shown as observed variables and the factors as unobserved variables. The explained variance of study success is 47%. For each item, the error terms (δ) as well as the items were weighted with the regression weight 1 for each factor. No significant influence could be established for the factor *information*. In our case study, it does not affect *conditions of study* (*A*, *D*, *E*) or *study success (C)*. Furthermore, the estimate of the factor *information* has a p-label of 0.947 and is, therefore, not significant. Therefore, *information* is not shown in Figure 4, and hypotheses **H10** and **H12** are not confirmed. The estimates of *H living condition* and *I physical resources and academic integration* are significant at the five percent significance level. All other factors' estimates are significant at the one percent level of significance. In contrast to previous research, no significant influence could be found between *study success* and *living conditions*. Therefore, hypotheses **H15** is also not confirmed. The lack of influence between *I* and *E* can be explained by the fact that no microphones and cameras are needed for exams.

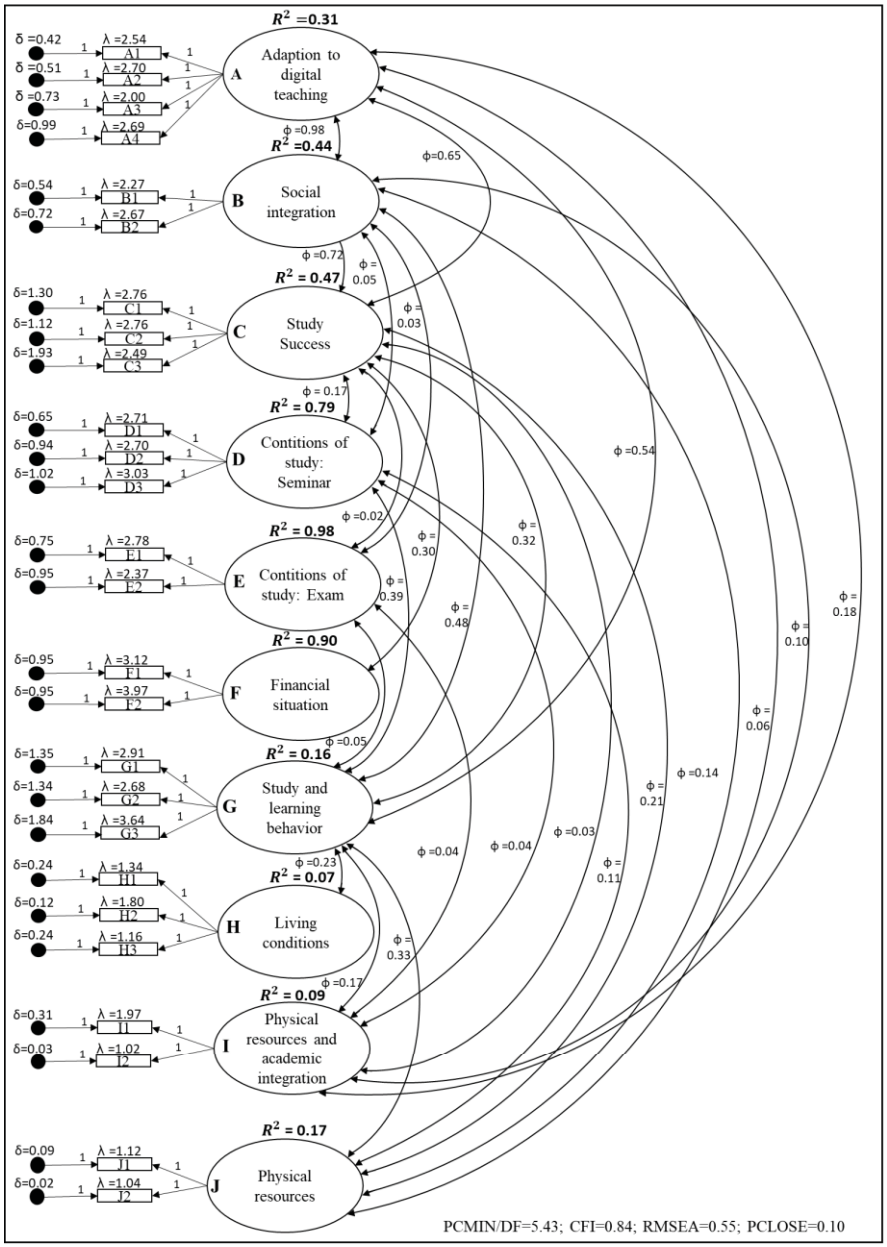

Fig. 4. Path diagram of study success in times of COVID-19.

Nevertheless, access through a laptop or desktop PC is necessary for examination, which is why the factor *I* has an effect on the factor *E* (ϕ=0.04). Besides, computers, cameras, and microphones are relevant for seminars as a *condition of the study*, shown by the relation between *I* and *D* (ϕ=0.04) and *J* and *D* (ϕ=0.11). Therefore, **H01** can

still be confirmed. Instead of the missing effect between *living conditions* and *study success*, the *living conditions* have a two-way influence on *study and learning behaviour* (ϕ=0.23). **H13** is confirmed. From the factor analysis, the fusion of physical resources with the remaining factors during the Corona Pandemic becomes apparent. Where these could be clearly delimited in previous research before Corona Pandemic, the technical resources are now relevant for several categories like the access to learning contents and the *adaptation to digital teaching* as a separate condition of study. All other physical resource influences tested could be proven, and therefore **H02** - **H04** can be confirmed. Also, the effects on *integration* examined in **H05** - **H08** can be confirmed. The strongest factor that mutually influences *study success* is *B social integration* (ϕ=0.72). The second strongest factor influencing *study success* is adapting *to digital teaching* (ϕ=0.65), followed by *study and learning behaviour* (ϕ=0.32), which confirms hypotheses **H08** and **H14.**

Besides, the *financial situation* also has a strong influence on *study success* (ϕ=0.30), so that **H16** is supported. Furthermore, Figure 4 shows an influence between the *conditions of study* and the *study and learning behaviour* for *A* and *G* (ϕ=0.54), *D*, and *G* (ϕ=0.39), as well as for *E* and *G* (ϕ=0.05). Thus, **H09** is supported. Besides, since a significant influence between *study and learning behaviour* and *integration* (ϕ=0.32) become apart, **H11** is also confirmed. The greatest influence is shown between the *adaption to digital teaching* and *social integration* (ϕ=0.98). It appears that the opinion on whether the transition to digital teaching is successful depends strongly on whether social integration has also been achieved.

5 Recommendations for Action

The items involved in the survey after the literature review and the factor analysis have shown, how technology is included in almost all categories that influence study success. Thus, the *adaption to digital teaching* considers the video software, the conditions of study regarding examination and seminar also contains the technology used to present contents, the access to the content depends on the desktop PC or laptop. Moreover, the *social integration* and *information* achieved also depends on digital media that are needed to interact with fellow students.

Our results can be used to prevent the long-term threat of dropping out and to promote study success. For example, technical support could be offered, and programs could be created to support social integration. In addition, the study and learning conditions can be adapted to living conditions by raising awareness of the students' personal barriers. It has also been shown that the conditions for seminars during the Corona semester differ than those for exams. They differ both in terms of living conditions or distracting factors and in terms of the technical equipment required or the social interactions between student and student and student and teacher. Especially for homework and seminars, up-to-date technical equipment for students is relevant. The study programs could either be adapted to the technical equipment or modernize the technical equipment. However, the strongest impact was given for the new factor *adaption to digital teaching*, which underscores the relevance of university preparation.

In addition to the category of *adaptation to digital teaching*, *social integration* should be considered. The focus of this category lies on communication and interaction in Distance Learning. This becomes evident by the high variance between these and physical resources and academic integration. Besides, digital consultation rooms could be offered to achieve targeted interaction in the digital semester between lecturers and students. It should also be noted that despite the advantages of digital communication, such as no teaching presence, the weekly working time of students has increased (*study and learning behaviour*). Nevertheless, the digital formats must be restructured and reworked (*conditions of Study: Seminar*). Furthermore, the examination conditions have to be reassessed according to the digital room's effort (*conditions of Study: Exam*). To enable equal opportunities for students, attention should be paid to ensuring that students have sufficient access to the courses (*physical resource and academic integration*). For example, seminar lectures or presentations (*conditions of Study: Seminar*) are held online. For this purpose, students must have a laptop or computer, a webcam (*physical resource and academic integration*), and a microphone (*physical resources*). The university could provide workstations at the university for students who have insufficient internet access to record exams. However, this is only possible in isolated cases due to contact restrictions. In our case, 1.1% of all respondents stated that they did not have a suitable technical device at their disposal. For this purpose, the university could purchase its own portfolio of laptops (*physical resources*) in order to support these students (*financial situation*).

6 Conclusion

This paper aimed to examine how the study success can be explained at a German university during the Corona Pandemic. To do this, we first examined the previous literature for holistic models describing study success. These categories found were examined concerning previously researched influences of the Corona Pandemic, which formed the survey‘s basis. Reliability and factor analysis revealed that a new factor *adaptation to digital teaching* emerged, which has a strong influence on study success, *social integration*, and *study and learning behaviour*. The analysis also showed, how technology plays a decisive role in almost all areas and can no longer be separated from other factors. This research can be used to derive recommendations for action for German universities to increase the study success during the Corona Pandemic and to learn for future university teaching. For example, institutional institutions could be created to provide advice to students and teaching staff. Especially digital communication and technical advice and equipment seem to be important under the current circumstances.

Even if we have done our work conscientiously, it is not free from limitations. Since its parameter was not significant, the results of the factor *information* must be critically questioned. Besides, the analysis represents a case study and is limited to the German university observed. Universities in other cultures or with different technical requirements could gain different experiences since political and higher education policy decisions also strongly influence the results. For example, the university examined changed over to Distance Learning throughout the semester. Other universities that

would have carried out hybrid teaching may have had different experiences. Furthermore, Figure 4 only explains the influences in Distance Learning during Corona Pandemic. Factors that are not influenced by the Corona Pandemic were excluded. There are also other conceivable relationships that have not yet been adopted. For example, the *living conditions*, which only affect *study success* and s*tudy and learning behaviour* according to our research model, could also have an impact on the examination and thus on *D* and *E*. Beyond that, this research deliberately focuses on the effects on students already enrolled at the university. Previous research have shown how school education, in particular, has an impact on the dropout rate at German universities [15].

Future studies could investigate the impact of home-schooling on long-term study success. Since the study and exams took place at home, disruptive factors may have an even greater impact than before. In this context, further studies could examine the effects of the loss of learning rooms and libraries during the universities‘ closure. However, consideration should also be given to seeing the Distance Learning during the Corona Pandemic as an opportunity for students. Besides more technical innovations in institutions and new teaching concepts, it offers greater freedom and flexibility. As mentioned in previous research, the time spent commuting is no longer necessary, and childcare and part-time work can be more easily combined with studies. Further studies could examine for which students the Corona Pandemic has predominantly positive consequences and for which students it has predominantly negative consequences. Research could also be conducted to determine whether prior experience with digital teaching and the ability to adapt to technological innovations had a significant impact on study success during the Corona Pandemic.

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