

Belonging in distance learning: The impact of interaction during the COVID-19 pandemic

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Abstract

The COVID-19 pandemic has created a unique situation in which higher education institutions, teachers, researchers, and students prove their ability to continue education online. In a longitudinal panel study at a German university, we investigated how freshmen and students in higher semesters (n = 72) cope with the online winter semester 2020/21. Commonly, a sense of belonging to a university is highly determined by academic and social engagement and positively impacts academic success and motivation. Due to the pandemic, the interaction between students, lecturers, and learning materials was limited to digital communication. The results reveal that interaction (student-to-content, student-to-staff, and student-to-student) hardly correlates with a sense of belonging, whereas correlations between interaction and academic success as well as motivation.

Keywords: *Distance learning; Sense of belonging; Social engagement; Academic engagement; COVID-19; Online.*

1. Introduction

During the worldwide COVID-19 pandemic most students have no other choice than distance learning. One of the reasons why students do not prefer distance learning is less social contact (Bashier and Elmossad 2020). In Germany, nearly all university students had to continue or start their new studies remotely in the winter semester of 2020. Students had to struggle with this situation all over the world, and some were more affected than others. In a study from a southeastern US university, students' most common stressors during the pandemic were identified as loss of routine, lack of social contact, as well as work, and finances (Halliburton et al. 2021). Taking into consideration the overall digital transition in life and industries, distance learning could increase in popularity in society after the pandemic. Before the pandemic, several studies revealed a relationship between a sense of belonging of students to their university or classroom and academic success, academic engagement, or emotional well-being (Freeman, Anderman, and Jensen 2007). Students who reported a higher level of satisfaction and motivation also stated a higher sense of university belonging (Pedler, Willis, and Nieuwoudt 2021). How students experience a sense of belonging in higher education distance learning is rarely analyzed. According to Rovai (2002), the meaning of belonging should be considered from the student's point of view. It should be also noted, that sense of belonging is a highly complex phenomenon. Ahn (2017), for example, identified four domains of university belonging after having examined 426 students from Bangor University in the UK in 2014 during onsite teaching: academic engagement, social engagement, surroundings, and personal space. The domain of *academic engagement* equates to curriculum, communication with lectures, and the whole educational process. Interaction and communication with fellow students in formal and informal groups as well as university activities at general and personal levels belong to the domain of *social engagement*. *Surroundings* include students' living space and their geographical and cultural location. Such meanings as life satisfaction, life attitudes, identity, and personal interests are allocated to the domain of *personal space*. Ahn's findings confirm the results of other studies, which identified, that students' sense of university belonging is, among other things, a result of social engagement and integrity (van Buer 2011; Petzold-Rudolph 2018).

Academic and social engagement becomes visible through interaction. According to Moore, there are three types of interaction at a university: student-to-content, student-to-staff, and student-to-student (Moore 1989). *Student-to-content* interaction refers to students' self-regulated learning with educational materials. *Student-to-staff* interaction implies communication with lectures and staff as well as the possibility to ask questions. *Student-to-student* interaction includes communication with fellow students and the possibility of knowledge exchange. An effective digital transformation process should entail the possibility to interact on these three levels. Hence, distance learning should not only replicate physical face-to-face sessions but make use of the virtual environment. The importance of social

contact should not be overlooked in the digital transformation of higher education, as personal contact with students and advisors has an impact on students' performance (Smith and Allen 2014). The pandemic is a unique situation to measure interaction since other aspects of academic and social engagement are not entirely available. In this investigation, we will concentrate on interaction and compare students that start a degree program during the COVID-19 pandemic with students that continue their studies. According to the following research questions, we will identify how freshmen and advanced students cope with the new reality of distance learning:

- RQ1:** How do students define a sense of belonging during the pandemic?
- RQ2:** Do the students have a sense of belonging to the University of Osnabrück and how important is this feeling for them during the pandemic?
- RQ3:** Does interaction as one manifestation of academic and social engagement impact the sense of belonging, academic success, or motivation during the pandemic?

2. Method

For this examination students in their first and advanced semester (third semester) at the University of Osnabrück, Germany, participated in a diary panel study during the online winter semester 2020/21. In a weekly survey, the participants reported on three courses. In addition, students filled out a monthly survey about interaction with the university lectures, fellow students as well as university staff, such as IT- or counseling services, and their sense of belonging. A total of two interviews, ten weekly questionnaires, and three monthly questionnaires took place with 72 students. The panel study was conducted in the German language and all aspects discussed here are translated for the presentation of the results. The survey was implemented using the online survey tool LimeSurvey. In total, 72 of the initial 90 students participated until the end of the semester (24 male, 46 female, 2 diverse; 34 first semester and 38 advanced students). For the study at hand, we will focus on the aspects of belonging, academic success, motivation, and interaction at three timepoints (t) combining the monthly, weekly, and interview evaluations. The study includes further questions that are not part of the investigation at hand. In total, for t1 69, and t2 and t3 each 71 participants could be included.

During the interviews, the students ($n = 72$) had to describe how they defined their sense of belonging to the University of Osnabrück. The statements were investigated by a content analysis following Mayring (2010). First, the main content of the transcribed interview was conducted. Second, a common level of abstraction was produced by a generalization of the identified content. In the next step, only content that answers the question was further integrated into the evaluation process to create items. In the final step of the content analysis,

identified items were transferred into the categories of sense of belonging according to Ahn (2017) with the help of a deductive approach.

The students were asked if they experienced a sense of belonging and if a sense of belonging is important for them. Both questions were asked in the monthly survey with a five-point Likert scale (totally disagree, disagree, partly, agree, totally agree). Timepoint 1 (t1) is at the beginning of the semester (early November 2020); t2 is before the winter holidays (end of December 2020) and t3 is at the end of the Semester (early February 2021). Academic success is measured according to the participants' self-evaluated learning outcomes according to Bloom's Taxonomy (Krathwohl 2002). *Motivation* is evaluated on a five-point Likert scale where the students indicate how much they are motivated to continue the lecture.

We refer to Moore's (1989) categorization of visible interaction to measure the influence of interaction. *Student-to-content* is a rather complex variable, as there are many different ways in how students interact with learning materials. To represent the interaction with the content, the students should agree or disagree on a five-point Likert scale: (1) If they were confronted with new learning content and (2) if they learned something new in context with the lecture. The mean of both statements is calculated as a *content score*. *Student-to-student* interaction was very limited during the pandemic. Therefore, we asked the participants how often they met with fellow students online and offline during the winter semester. They were allowed to include any meeting independent of its purpose, like group activities, interactive learning, or private issues. A high frequency of meetings is interpreted as a high interaction with other students. We coded the frequency of meetings independent of offline and online as a *meeting score* (never (1), monthly (2), weekly (3), and daily (4)). We investigate *student-to-staff* interaction according to which lecture format the students participated regarding the three (free chosen) evaluated lectures with the following scores: canceled (1), online asynchronous (2), online synchronous (3), mixed online and face-to-face (4), and face-to-face lecture (5). The scores reflect the interactivity with zero for canceled lectures and a five for face-to-face onsite lectures.

The correlation of the data is calculated according to Spearman's ρ with $r > .10$ as low, $r > .30$ medium, and $r > .50$ high effect size (Cohen 2013). In addition, the p-value is calculated to indicate the statistical significance. The data conducted in this survey needs to be interpreted with caution due to several limitations: The investigated student group is highly motivated since the first 44 male, 44 female, and two diverse responding volunteers were selected for the survey. Eighteen respondents did not participate until the end. The constructs of a sense of belonging, academic success, and motivation are very complex and interaction is only one aspect that may determine it. Finally, the pandemic situation creates a unique test environment to investigate distance learning for diverse students who probably would never decide to undertake an online semester or study.

3. Results and Discussion

3.1. Sense of Belonging to a University

To define a sense of belonging to an institution is rather abstract. During the interviews, the students mainly described what they associate with the University of Osnabrück. For further investigation, we focus on the 72 volunteers that participated until the end of the survey. In total, 180 items are mentioned by the students which we assigned to 30 categories. In the mean 2.5 items are mentioned by the participants. 19 students mention one, 23 mention two, 16 mention three, and 14 mention four or more items in their statement. In the next step, the items are assigned to the four domains of belonging identified by Ahn (2017). No additional dimension was identified in the current study. Similar to her findings, our data reveal that social engagement is mentioned the most by students (Figure 1).

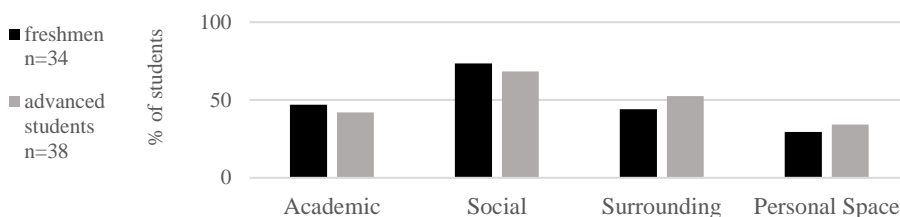


Figure 1: Four dimensions of sense of belonging to University of Osnabrück n=72 (see Ahn (2017) for further information of the categories and dimensions).

Comparing freshmen and advanced semester students, the dimensions of *academic engagement* and *social engagement* were mentioned most by first-semester students. Whereas the categories *surrounding* and *personal space* are mentioned most by advanced students. Within the domain *academic engagement*, the students refer to the university (n = 22), curricula (n = 15), tutor (n = 5), education purposes (n = 2), or service (n = 1). Only one student indicates the online environment of the university which is also an item in the category university. Within the dimension *social engagement*, the students mention contact to fellow students (n = 38), contact to lectures (n = 12), activities and events (n = 12), participation in university-related groups (n = 7), and mates (n=1). Physical places are mentioned within the domain *surrounding*, like Osnabrück as a city (n = 10) or being physically present (n = 28). Referring to the domain *personal space*, students mention items related to student (n = 11), life satisfaction (n = 8), pride (n = 4), or life attitudes (n = 2).

Contact to other persons as well as places at the university, like the library or dining hall, were mainly not available in person.

In addition, the students had to agree or disagree, if they felt that they belong to the University of Osnabrück and if this feeling was important to them. As shown in the boxplot visualization in figure two, freshmen are very constant in their responses. Most students disagree or partly agree to have a sense of belonging. The median drops from partly/disagree at time t1 to disagree at times t2 and t3. Responses according to the importance of a sense of belonging are constant at all three timepoints. On average, freshmen agree that this feeling is important. Advanced students respond slightly differently. On average, they partly agree to have a feeling of belonging whereas the interquartile range (50% of respondents represented by the box) shrinks from the range of agree to disagree at t1 to the range between partly to disagree at t2 and t3. For the second statement on the importance of a sense of belonging, the interquartile range is between agree and partly at t1 and grows to the range agree to disagree in t2 and t3. On average, the advanced students agree with this statement at time t1 and partly agree at t2 and t3.

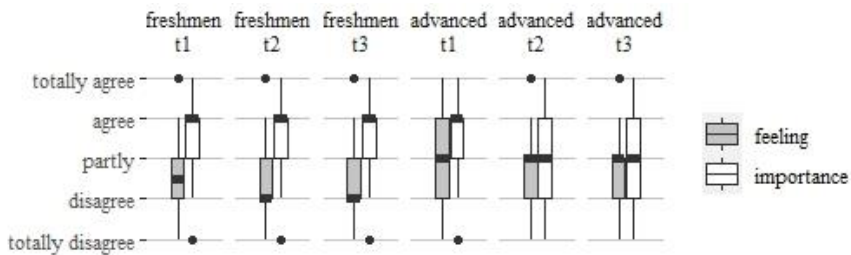


Figure 2: Sense of belonging to University of Osnabrück at three timepoints indicated by freshmen and advanced students. (Left plot: I feel that I belong to University of Osnabrück. Right plot: A sense of belonging to University of Osnabrück is important for me.)

3.2. Interaction concerning belonging, success, and motivation

As presented in table one, the scores for “content”, “lectures”, and “meeting” as defined in the method are set in correlation to “sense of belonging”, “academic success”, and “motivation”. Taking all data into account, a statistical significance could only be calculated for correlations $r \geq 0.2$. The values below show no statistical significance. Sense of belonging shows no or low correlation with the other values except for two timepoints where the meeting score correlates negatively and significantly (freshmen at t3 with -0.53^{**} and advanced at t2 with -0.24^*). This indicates that the frequency of contact between students negatively impacts the students’ sense of belonging for these two timepoints. One additional negative correlation of the meeting score is identified with academic success for freshmen at time t1 ($r = -0.22^*$). The negative correlation could be explained by the pandemic situation where students had mostly online contact primarily with students they only just met. During the interviews, the students stated that getting to know each other is hard in the online

environment. Looking at academic success, a positive significant correlation becomes more likely with the calculated content scores and for lecture scores at time t3. For freshmen, an increase in the correlation from time t1 till t3 can be identified. This may indicate that over time the students interact more with the content and have a higher understanding of the learning materials. At the end of the semester, additional meetings and question hours were offered by the lecturers as mentioned by the students. This may explain the correlation of time t3 (academic success and lecture score). Content and lecture scores correlations with motivation increase as well overtime except for lecture score at t2 for the freshmen. The positive correlations may indicate that the student’s interaction with the content and interaction during the lectures positively impact their motivation. Not shown in the table is that academic success and motivation have a constant statistical significance of $r \geq 0.5$ at all timepoints and in both student groups. Sense of belonging and motivation have a statistical significance with $r \geq 0.22$ except for advanced students at time t1 with $r = 0.14$. Academic success and sense of belonging show no statistical significance with $0 \leq r \leq 0.16$.

Table 1: Spearman ρ correlation for sense of belonging, academic success, motivation with content, lecture and meeting scores

		sense of belonging			academic success			motivation		
		t1	t2	t3	t1	t2	t3	t1	t2	t3
freshmen	lectures n =	93	95	87	93	95	87	93	95	87
	content score	- 0.04	0.10	0.04	0.15	0.40**	0.54**	0.21*	0.32**	0.57**
	lecture score	- 0.01	0.10	0.02	0.05	0.09	0.38**	0.21*	0.18	0.32**
	meeting score	- 0.04	0.16	-0.53**	-0.22*	- 0.04	- 0.06	- 0.01	- 0.10	- 0.19
advanced students	lectures n =	105	99	90	105	99	90	105	99	90
	content score	0.03	0.09	0.15	0.24*	0.40**	0.40**	0.11	0.24*	0.28**
	lecture score	- 0.04	0.03	0.16	0.13	0.09	0.46**	0.04	0.25*	0.35**
	meeting score	- 0.13	-0.24*	0.07	- 0.05	0.05	0.06	- 0.04	0.05	- 0.03

t1-t3 = time point of investigation, t1 n = 69 (freshmen n=33, advanced n = 36), t2&t3 n = 71 (freshmen n = 34, advanced = 37); lectures n = number of complete responses; p < .01 = **, p < .05 = *)

4. Conclusion

The findings of this investigation show that interaction has a minor correlation to a sense of belonging. This implies that interaction alone is not enough to explain it. This result is confirmed by the negative correlation between the meeting score and the sense of belonging for freshmen at the end of the semester. Interaction is more likely to correlate with academic success and motivation. Especially, the content interaction shows a positive impact on academic success and motivation. However, a sense of belonging to an institution might be an abstract phenomenon for students to understand, therefore the results show no correlation to other scores. In future work, we would like to discuss our findings in more detail in combination with the qualitative data from the interviews as well as in context of other

studies. Further, investigating of the sense of belonging to fellow students or to courses could achieve other results.

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