

**Student-Teacher Relationships:**

The Dimensions of a Beneficial Student-Teacher Relationship in Distance Learning at Higher  
Education

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## Abstract

**Introduction:** The Covid-19 pandemic led to the widespread implementation of digital learning in higher education resulting in a regression of student well-being and academic success. Student-teacher relationships are a crucial factor for student well-being. The nature of the relationship depends on the context. The literature revealed a three-dimensional model describing student-teacher relationships in higher education with affiliation, attachment and assertion. Another model defined student-teacher relationships in digital learning at high schools with a closeness and conflict dimension. The literature was inconclusive on student-teacher relationships in higher education's digital learning. Therefore, the study aimed to identify and compare the relevant dimensions to the abovementioned models.

**Methods:** A qualitative approach allowed us to gain new insights into the relationship characteristics in the specific context. Eighteen second and third-year Bachelor students of the University of Twente with different nationalities and study backgrounds were interviewed. Transcripts were thematically analysed, and overlaps between themes and the existing models were determined.

**Results:** Three themes were identified in the data with multiple subordinate codes each: Support (Engaging with students, Autonomy of students, Availability of the teacher, private conversation and feedback), Affective (Non-verbal communication and Showing interest in the students) and Professional skills (Conflict-solving skills, Expertise and Mutual respect). No pre-known model fully covered all three dimensions. But all three dimensions overlapped with the models' dimensions; thus, no dimension was completely new.

**Discussion:** The study improved the understanding of beneficial student-teacher relationships in higher education's digital learning and its relation to previous models. Limitations were sample representativeness and reliability of the comparison results. Recommendations were specified for student well-being promoting interventions at the University of Twente. It was called for concretising the best-fit model and its dimensions.

*Keywords:* student-teacher relationship, distance learning, University of Twente, qualitative interviews, student well-being

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## Introduction

The Covid-19 pandemic severely changed the educational system and, thus, students' lives. Due to the pandemic, higher education has widely adopted digital learning (Fabrız et al., 2021). Despite the advantages of digital learning, the online context leads to new challenges for students' academic engagement, development and mental health (Petillion & McNeil, 2020). Especially the reduced social interaction between students and their teachers limits the effectiveness of digital learning (Hermanto & Srimulyani, 2021). Although numerous research papers highlighted the importance of student-teacher relationships for student welfare and learning progress, there is not sufficiently thorough research in the digital setting of higher education (Xiao et al., 2023).

First digital learning served as a solution for the lockdown, but due to its advantages, education is still offered online (Imran et al., 2023). The advantages of digital learning are cost-effectiveness and accessibility (Chand & Lal, 2021; Hannay & Newvine, 2006). Students can participate in their classes from anywhere and go through recorded lectures and other study materials anytime, enabling them to adapt their learning process to their needs (Chand & Lal, 2021). In distance learning, universities can educate more students simultaneously (Hannay & Newvine, 2006). Hence, digital learning contributes to the educational system's inclusiveness and effectiveness.

Regardless of the benefits of digital learning, it can also carry some disadvantages within the education sector. On the one hand, digital learning seems to increase accessibility. On the other, it becomes apparent that only students with the necessary devices and a stable internet connection can engage with the teacher and classmates (Chand & Lal, 2021). Studies also highlighted that distractions through household members, background noises, and technical issues decrease student concentration on their interaction with the teacher and thus reduce participation (Brachtel et al., 2023). Without sufficient participation, digital learning loses effectiveness. Moreover, students often complain that digital learning impedes social connectedness because interpersonal interaction is lacking (Syahputri et al., 2020). Student's mental health, learning progress and engagement can suffer under the restrictions.

The application of digital learning varies in the integration of interactive elements. Synchronous elements, such as online tutorials, enable immediate interaction, whereas asynchronous elements, such as discussion boards, require students' initiative to be useful.

(Fabrizz et al., 2021). Students prefer a combination of both. Consequently, in the present study, digital learning is the most promising version combining asynchronous and synchronous features.

One part of social interaction is the interaction between students and teachers, described as the student-teacher relationship (Xiao et al., 2023). The student-teacher relationship is important as it influences students on a social, behavioural, and academic level (Roorda et al., 2011). Long-term benefits of the affective connection between student and teacher are increased student engagement, academic success, and social adjustment (Roorda et al., 2011). Hence, the effects are not only relevant for the academic context but even have implications for the later career chances of students (Roorda et al., 2011). A beneficial student-teacher relationship contributes to students' personal growth and boosts their self-confidence (Gillespie, 2005). The student-teacher relationship is a crucial factor for students' long-term welfare.

Student well-being and its link to student-teacher relationships add to the importance of these relationships (OECD, 2015). According to a scoping review, well-being consists of multiple domains (Hossain et al., 2022). Diverse student well-being approaches describe eight common domains, including positive emotions but a lack of negative emotions, the experience of quality relationships, academic motivation and success. In addition, students with high well-being see a purpose in their studies, are mentally and physically healthy and have the necessary academic recourses. The relationship with teachers and peers was the most frequently reported domain (Hossain et al., 2022). Besides the direct contribution of positive student-teacher relationships to student well-being, the relationship also influences academic success, improving well-being (Deci & Ryan, 2012). The link between well-being and academic success is bilateral. Higher levels of well-being make the student more invested in their study, resulting in better academic achievements. At the same time, experiencing success in their studies makes the student feel competent and boosts the student's well-being (Deci & Ryan, 2012). Student well-being seemingly links student-teacher relationships with additional effects on students.

Other adverse effects on students accompanying the decline in student well-being are worrying. The well-being of 68% of university students in the Netherlands worsened with the introduction of Covid-19 measures in 2020 (Meulenbroeks & van Joolingen, 2022). Student well-being is crucial for academic success, mental and physical health, and personal growth (Aulia et al., 2020). A study questioning students worldwide revealed that 96.7 % experienced a

decline in academic performance (Mahdy, 2020). Students with low well-being experienced higher stress levels and loneliness (Meulenbroeks & van Joolingen, 2022). They struggled with planning their daily activities, were more prone to develop depression or substance abuse disorder and commit minor crimes (Govorova et al., 2020; Meulenbroeks & van Joolingen, 2022). Therefore, protecting student well-being is vital to avoid the listed profound negative effects on academic achievements and student health.

When promoting student well-being, the person's context plays an important role. The context directly impacts student well-being and influences the student-teacher relationship (World Health Organisation, 1986). The health promotion approach assumes that “health is created and lived by people with the settings of their everyday life, where they learn, work, play, and love”. Likewise, the circumstances for beneficial student-teacher relationships depend on the specific context (Hagenauer & Volet, 2014). Expectations, understanding and perceptions of what a positive student-teacher relationship entails differ, for instance, between countries, educational levels and course settings. Recognising the influence of context is essential in promoting student well-being. The present study deals with student-teacher relationships in the increasingly popular context of higher education and digital learning.

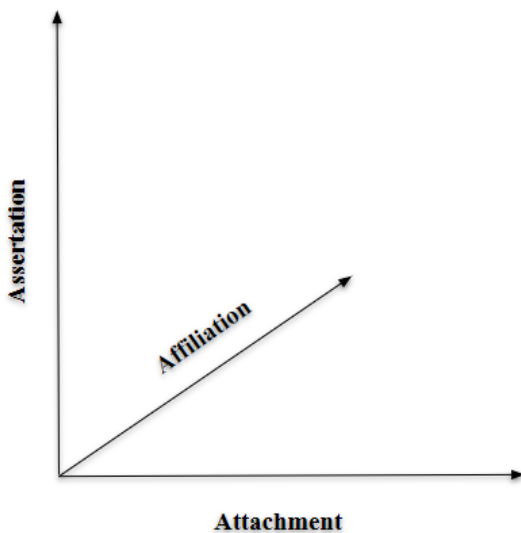
The implications of higher education for the student-teacher relationship lacked research for a long time (Hagenauer & Volet, 2014). Even though research over the past years has shown the importance of student-teacher relationships in higher education, the theoretical framework remains underdeveloped (Tormey, 2021). Multiple studies tried to capture the dimensions of student-teacher relationships in higher education in various models. However, additional specifications of the differentiation and interconnectedness of the dimensions were needed. In other words, the comparison and combination of models were necessary to provide a generally applicable conceptualisation of student-teacher relationships in higher education.

The current understanding of the student-teacher relationship in higher education combines the dimensions in different models (Tormey, 2021). The three-dimensional model defines student-teacher relationships at universities in terms of “affiliation/warmth”, “attachment/security”, and “assertation/power/status”, as depicted in Figure 1. The assessment of the model with the Classroom Affective Relationship Inventory demonstrated its applicability to a broader cultural context. Additionally, the researchers suggested consolidating affiliation and attachment into a single dimension, proposing a two-dimensional model while acknowledging

that this reduction may only be suitable for Western cultures. Within the three-dimensional model, the affectionate dimension named affiliation is essential to social interaction. Other researchers referred to the dimension as “cooperation”, “closeness”, “goodwill”, or “care”. The attachment dimension revolves around the student's ability to trust and rely on the teacher. Lastly, the assertation dimension deals with the impact of anger, shyness and humiliation on power dynamics and social status. For the context of higher education, affiliation, attachment and assertation were identified as dimensions of the student-teacher relationship.

**Figure 1**

*Three-Dimensional Model of Student-Teacher Relationships in Higher Education*



*Note.* The affiliation and attachment dimensions were placed close together to indicate the possibility of a two-dimensional model.

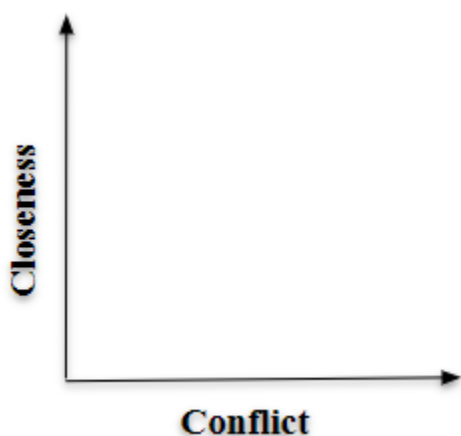
Compared to the higher educational context, the dimensions of the student-teacher relationship within a digital learning environment are relatively more underdeveloped. A recent study compared student-teacher relationships in digital learning to classroom learning (Vagos & Carvalhais, 2022). The study noted the emotional bond as a critical element of student-teacher relationships. Levels of closeness and conflict defined the student-teacher relationship quality for both contexts (see Figure 2). The definition views student-teacher relationships from a teacher's perspective (Pianta & Nimetz, 2001). High levels of closeness mean the teacher perceives a positive emotional relationship with the student and beneficial communication. The teacher would believe they offer adequate resources to the students that they can use as support. Moreover, the dimension implies that the teacher is aware of the student's well-being. The

conflict dimension is concerned with the dynamics between student and teacher. Teachers noted high levels of conflict when their relationship with the students was problematic, and the student appeared angry. The teacher felt ineffective and exhausted by the unpredictable behaviour of the student (Pianta & Nimetz, 2001).

It is unclear whether the definition of student-teacher relationships in digital learning is still contemporary because it was adopted from the article of Pianta and Steinberg in 1992 (Vagos & Carvalhais, 2022). Digital learning has evolved since the definition originated 21 years ago. Moreover, due to its sample of Portuguese high school students and teachers, the study may not be representative and thus applicable to other contexts. The findings and definitions may differ in higher education and deviating national contexts. For this purpose, it is crucial to identify the dimensions that accurately describe a student-teacher relationship in digital learning, as it is practised nowadays within the higher education system.

### Figure 2

*Student-teacher relationship in digital learning according to Vagos & Carvalhais (2022)*



The claim that the definition may no longer apply today is supported when reviewing the evolution of digital learning that culminated in peak usage in the past years. The Covid-19 pandemic caused a sudden transition from almost all classroom learning into distance learning (Fabríz et al., 2021). Especially the beginning of the pandemic showed that students and teachers needed to be more adequately prepared for the transition (Hebebeci et al., 2020). As a result, digital learning was characterised by improvisation instead of organisation (Fabríz et al., 2021). Nevertheless, various digital learning resources were readily accessible at that time compared to the past (Bygstad et al., 2022). In the 1990s, the university just began to implement course



websites. The first learning management system introduced in 2005 was considerably unpopular among students resulting in minimal utilisation. It took ten more years to develop the learning management system Canvas. Despite its potential, the adoption rate rose only to some degree, possibly due to the preference for traditional physical learning environments. Digitalisation in higher education received a big boost through the pandemic, leaving no other choice than broadly adopting all kinds of digital resources for educational purposes (Bygstad et al., 2022). Although first met with scepticism, digital learning has become a major component in higher education since the pandemic.

The University of Twente is one of the universities focusing on integrating technology. In 2022 the University of Twente has rated the best technical university in the Netherlands (University of Twente, n.d.-c). The university believes teaching creative and interdisciplinary skills prepares its students for future challenges (University of Twente, n.d.-b). Similar to other universities, the University of Twente decided to continue offering digital learning options (KNAW, 2022; University of Twente, n.d.-a). Nevertheless, the University of Twente is concerned about declining student well-being (De Kiewit, 2023). So, they designed a student well-being improvement programme. The programme's latest version does not entail any interventions considering the role of the student-teacher relationship. Hence, the University of Twente may be interested in learning about student-teacher relationships in an online environment and how they can promote student well-being.

Although it has been public knowledge for years that a high-quality student-teacher relationship can benefit students, context dependency limits its utilisation. The missing research on the dimensions of student-teacher relationships in digital learning of universities is a wasted potential to promote student well-being and academic achievements. The University of Twente aims to improve well-being among students. Regardless of the negative impact on student well-being that accompanied the introduction of digital learning, the University of Twente continues using it. Promoting student well-being requires a profound understanding of quality student-teacher relationships tailored to the context. Due to the lack of knowledge regarding the concrete dimensions of student-teacher relationships in the digital learning of higher education, new insights must be acquired to contribute to a general understanding of the context's implications. Prior studies only established dimensions: affiliation, attachment and assertion for classroom higher education. It must be clarified if the exact dimensions apply to digital learning. Likewise,

it requires further investigation whether the closeness and conflict dimensions are relevant and also apply to higher education's digital learning. Hence, the current state of knowledge only considers the quality of student-teacher relationships in higher education or digital learning in high schools but not in the digital learning environment of higher education. Hence, the following research questions arise:

- 1) What are the dimensions of a beneficial student-teacher relationship in distance learning at the University of Twente?
  - a. Which dimensions of the three-dimensional model of Tormey (2021) or the two-dimensional model of Vagos & Carvalhais (2022) may apply?
  - b. What new dimensions can be detected?

## **Method**

### **Design**

This qualitative descriptive study was conducted within a larger research project involving five researchers examining the effect of student-teacher relationships on student well-being. The focus of the current paper was explicitly on the student-teacher relationship in the context of distance learning at the University of Twente.

Qualitative interviews were chosen to gather data about students' personal experiences. The flexibility of the interview format enabled the researcher to ask for clarification when necessary. Moreover, interviews allowed students to give detailed explanations through encouragement to elaborate.

### **Participants**

For this study, 18 university students were recruited using convenience sampling. Participants were fellow university students approached in person or over the phone. The study included only University of Twente students over 18 years studying full-time. Additionally, participants were required to speak English, creating a shared understanding for all researchers and supervisors and avoiding translation mistakes for the data analysis. All participants gave informed consent. As shown in Table 1, the participants were evenly split, in terms of gender, with 9 participants being men and 9 being women. The mean age of the participants was 21.72

years ( $SD = 0.96$ ). The participants had diverse nationalities. The majority was German, accounting for eight individuals. Six participants came from Romania, two from the Netherlands and one from Armenia and Greece. The Faculty of Behavioural, Management and Social Science Ethics Committee at the University of Twente provided ethical approval (20.03.2023).

**Table 1**

*Demographic Data of the Interviewees (N = 18)*

Sample Characteristics	<i>N</i>	<i>%</i>	<i>M</i>	<i>SD</i>
Gender				
Men	9	50		
Women	9	50		
Age			21.72	0.96
Nationality				
German	8	44.44		
Dutch	2	11.11		
Romanian	6	33.33		
Greek	1	5.56		
Armenian	1	5.56		
Type of study				
Psychology	9	50		
Technical Computer Science	4	22.22		
International Business Administration	2	11.11		

Civil Engineering	1	5.56
Management Society and Technology	1	5.56
Creative Technology	1	5.56
Study year		
Second year	2	11.11
Third year	16	88.89

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## Materials

The online interviews were semi-structured and required a laptop or another technical device compatible with Microsoft Teams. All researchers used an interview guide entailing four demographic questions, a total of 27 questions and probes to generate more detailed responses (see Appendix A). Only the demographic and six open interview questions were relevant to the present research.

The first question aimed to generate a general impression of what aspects contribute to or damage the student-teacher relationship in an online setting. Not mentioning any dimensions of other models in the first question was crucial to avoid overlooking any context-specific new dimensions. Moreover, asking for positive and negative aspects also enabled identifying undesired behaviours. However, the purpose of the question was to bring about responses proving or disproving an attachment dimension; thus, no additional question was explicitly concerned with this dimension.

Then, the following two questions examined the manifestation of the affectionate dimension described by Tormey (2021) and Vagos & Carvalhais (2022) as closeness. Since the dimension was likely relevant based on findings in the overlapping contexts of higher education and digital learning, two specific questions were dedicated to it.

Subsequently, the fourth question was formulated based on the knowledge that a beneficial student-teacher relationship improves student motivation. The question aimed to make

students aware of so far forgotten or unmentioned aspects by giving them more information at hand to browse their memory for new examples.

The last two open questions gathered information that may relate to the conflict dimension of Vagos & Carvalhais (2022) or the assertion dimension of Tormey (2021). One question inquired about role distribution between students and teachers in a conflict situation. The other dived into the desired behaviour of a teacher when an issue occurs.

## **Procedure**

Before the final interviews, two pilot tests were meant to reveal aspects that needed further improvements. Both pilot tests' durations were 45 minutes. The outcome of the pilot tests indicated that certain questions were difficult to answer on the spot. Therefore, we designed a prompt sent to the participants after scheduling the interview. The prompt stated, "Before the interview, we would advise you to already think about student-teacher relationships that you encountered at UT that are memorable for you or had a special or significant impact on you.". An additional introduction for the six questions about distance learning ensured that participants would not answer the questions in a different context. Moreover, the last question seemed to generate similar answers to the first two questions and thus was put after these questions with the additional remark to give specific examples.

Interviews were scheduled via WhatsApp and held and recorded between 29.03.2023 and 11.04.2023 using Microsoft Teams. All respondents had to give their informed consent (see Appendix B), which they received before the interview in the Microsoft Teams chats. The respondents received the information that the data storage continued for six months after the interview. The interviewees again had to agree with the recording of the interview verbally. Moreover, they received the contact information of all researchers. Then the interviews began with questions regarding their demographic characteristics such as gender, age, nationality, study programme and year of study. During the interview, using prompts helped clarify answers when necessary or stimulated longer and more extensive responses. When the interview ended, the interviewer thanked the participant and reminded them about the consent. Subsequently, the interviews were safely stored for the following data analysis was conducted.

## **Data Analysis**

To analyse the data, it first had to be prepared. For this reason, transcriptions of the interviews were created with Microsoft Teams and then downloaded. Every researcher adapted any information that may enable the participant's identification in the transcript. Additionally, the recording errors were corrected to improve readability. Then the 18 transcripts were imported into ATLAS.ti Web in a shared folder accessible by all researchers.

Subsequently, an inductive thematic analysis, according to Braun and Clarke (2006), was performed to explore and determine meaningful patterns in the transcripts. An inductive approach was employed to detect all relevant information on student-teacher relationships within digital learning of higher education without overlooking any important dimensions that the models of similar contexts did not yet cover. The six steps of the thematic analysis were systemically followed to ensure a comprehensive analysis.

The first step is to familiarise oneself with the data by reading the transcripts (Braun & Clarke, 2006). The aim is to create a profound understanding of the transcript by becoming aware of recurring ideas and interesting segments related to the research topic. Overall, it facilitates the subsequent work with the data because one obtains a broad overview of all responses.

Second, a collaborative process generated the initial codes. All researchers went through two transcripts during a meeting to check for relevant segments and then gave the segments a label reflecting the main ideas. The codes were formed based on multiple criteria. They had to be related to the research question and reflect the meaning of its segments. Additionally, the codes should be applied consistently to segments capturing kindred ideas. At the same time, codes must be exclusive. Codes should not overlap but rather be clear and specific in their definition. Lastly, the choices of codes were discussed within the group until the majority agreed on a code ensuring intercoder reliability. Intercoder reliability means that the codes were not subjective, but other coders would have coded the segments similarly.

Afterwards, all researchers started coding their interview parts in the remaining transcripts with the initial codes. Adapting and adding codes was necessary when segments did not fit a specific code.

The third step included systematically sorting the codes into broader themes. Codes were grouped based on possible relatedness. Themes captured the link between the grouped codes. The code groups with all relevant data meaning multiple example segments per code, were

collected in a Google Docs document. Multiple repetitions were performed to make the themes and their codes more coherent. Furthermore, the relevance of the codes and themes for the research questions had to be considered. Codes or themes that did not answer the research questions were deleted.

Next, two researchers collaboratively revised and improved the themes. They discussed the themes' accuracy in describing the allocated data by looking at multiple exemplary segments. The discussion added to the intercoder reliability. Adjusting themes was necessary to mitigate potential bias from the researcher's knowledge of known models and their dimensions. Subsequently, a coding scheme table displayed the organisation of themes and codes.

The themes were named as dimensions to help answer the research questions, and content-based definitions were created. The themes' names resembled the dimensions of established models when they covered similar content. The researcher added illustrative segments per code and concise descriptions of themes to ensure consistent application.

Finally, the last step was to report on the results more extensively. Code frequencies listed in the table allowed for interpretations concerning their significance and specificity. The researcher described the in-depth meaning of themes and codes using additional segments to emphasise the code's richness. Reviewing transcripts helped identify codes participants often mentioned together.

The findings were then compared to the existing dimensional models to find which aspects overlapped and which might be new additions.

## **Results**

The thematic analyses resulted in three themes organised in a coding scheme (see Table 2). The themes reflect the essential dimensions of forming a beneficial student-teacher relationship in digital learning at the University of Twente. Support, affect, and professional skills were identified as relevant dimensions.

### **1. Dimension of Support**

The first theme that became prominent was the dimension of support. It entails multiple codes representing ways teachers can create a supportive learning environment for students online. Creating the impression of students being supported by the teacher is mainly related to

interactions. More specifically, the dimension captures the accessibility of quantity and quality of interaction, the setting in which it takes place, and its purpose.

### ***1.1 Engaging with Students***

Engaging with students was the most mentioned aspect of a student-teacher relationship by students. The code describes the way students want their teachers to enter an interaction with them but also encourages them to participate more. The students explained how different teaching methods were helping them to stay more focussed and helped them to better the material. Students were more likely to participate when the teacher made the class fun. To be more precise, students reported how serious games such as “Kahoot” but also “polls” or “making jokes” resulted in a better learning atmosphere. They increased their motivation as well as the learning process. Further active involvement strategies were listed, such as “addressing students with their name”, “just asking questions”, or even “having some personal stories”. The diversity of lesson planning contributed to student-teacher interaction quality. Moreover, students reported feeling more connected to teachers who involved their students using the above-listed methods. However, this code also revealed some disengaging behaviours shown by teachers, which students perceived as disruptive to the relationship between student and teacher. For example, “having like a monologue”, “looking at the slides, reading them down in a monotone voice, just clicking through it”.

### ***1.2 Autonomy of the Student***

University students are autonomous in a digital learning environment because they can decide to what extent they want to participate and when. Under this condition, students can more easily satisfy their own current needs when necessary. These needs can vary between academic needs and more personal ones. A more personal need is to take coffee breaks to maintain concentration in class. These decisions give the students freedom but come with the responsibility to do the necessary work to pass their studies. One student noted that he finds it “supportive being more autonomous with scheduling and if I have any question, I simply e-mail them rather than them saying ohh like find a suitable time to have a meeting with me physically.” Acknowledging the responsibility of choosing when or how to engage in study activities was considered the downside of autonomy. A student admitted, “I was barely like there with the online things it was always recorded.” A different student explained: “Now the students are responsible for their own actions if they want to pay attention or not to be there at all. It is their



decision, and then they should live with the consequences.” The second quote shows the student’s awareness that they are more in charge of their academic fate in a digital learning context. The context may facilitate students' disengagement by allowing them to watch recordings. The lack of participation is, however, recognised by students as harmful to their academic careers.

This code was often found in connection to the previous code, engaging with students saying that the teacher can try to pressure the students to participate by asking them directly to unmute, but in the end, the student still has the choice if they want to or not. The link between the two codes is the interplay between the power dynamics of students and teachers. However, students are more autonomous regarding making decisions for their academic engagement. The teacher can still use their authority in class to prevent them from disengaging.

### ***1.3 Availability of the Teacher***

The possibility of satisfying students’ academic needs described in the previous code is limited to the teacher's availability. The code stresses the importance for teachers to be readily available. The students felt more supported when they could easily reach out to the teachers and receive fast responses. In particular, for situations in which the students depend on the teacher's help, the teacher not being available in the moment or even over a more extended period prolongs the working process of the students and was described as “annoying”. However, one student reported positively about his teacher that “he had five different ways of contacting him, and he would respond to all of them like he had Slack, he had Discord and everything. You could just contact him, and he would just respond.” Another student explained how his teacher displayed high availability within a synchronous lecture. The teacher told the students, “just unmute yourself and interrupt me if you have a question.”

### ***1.4 Private conversations***

Another supportive factor was private conversations, which referred to teachers talking to groups or individuals alone. Students valued private conversations the most for sensitive topics such as personal issues, concerns, and group conflicts. The private conversations were often called “normal conversations” and produced a feeling of personal connectedness to the teacher. Students explained that they felt more comfortable speaking to a teacher in a smaller group or even one-on-one because one could “talk to them about anything”, “that you can express your thoughts and ideas”, and “ask all your questions and get more security”. One student clarified

that private information “should definitely not be discussed in front of the whole class”. The statement shows that private conversations are necessary for specific discussion topics.

Disregarding this fact was evaluated negatively.

### ***1.5 Feedback***

Lastly, the teacher can support students by giving or asking for feedback on their teaching performance. Students better comprehended what was expected of them when receiving individualised feedback on their academic progress. The feedback should be well-explained and open for discussion. Moreover, the advice can entail information about how the teacher can help, making the students feel calm and that the teacher took care of them. Nevertheless, the effect of feedback differed when it was dominantly negative or positive. Overly negative feedback was not considered supportive, whereas praise from the teacher increased teacher popularity. One participant said, “if they are praising me as well, then I would feel more connected.” On the other hand, another student mentioned: “obviously, it is disruptive if they are criticising again everyone or like an individual in an online meeting”.

The fact that negative feedback was considered disruptive may be related to the link between feedback and private conversation. Both codes were often found together because negative feedback is a personal and sensitive topic best discussed one-on-one.

## **2. Dimension of Affect**

The second theme that emerged was the dimension of affect, focusing on emotional and relational aspects of the student-teacher relationship. This dimension is mainly characterised by communication through or about emotions. The analysis revealed that the following codes are important for how the students perceive being cared for.

### ***2.1 Non-verbal communication***

Non-verbal communication is essential for an improved understanding between teacher and student. It includes displaying and recognising the emotions of the conversation partner, which in turn can trigger an emotional reaction. This form of communication is based greatly on body language. Since in digital learning, camera quality or frame limits the perceptibility of emotional cues, the affectionate level of communication suffers. Nonetheless, in functioning non-verbal communication, students like to see their teachers “enthusiastic, happy” and “if they are kind or smiling”. A student said concerning teachers showing emotions, “I feel like it’s kind

of contagious.” Whereas “not really being able to see the teacher” was perceived as a “little bit synthetic”.

## ***2.2 Showing Interest in Students***

Teachers who showed interest in their students were considered particularly caring. Showing interest refers to inquiries about students’ emotions, personal thoughts and concerns less related to the actual study content. With these questions, teachers learn about their students’ psychological well-being. Offering everyone to share their personal experience and feelings was described as an inclusive factor. A participant explained, “they are very interested in how you feel and how you perceive the situation at the moment.”. The students liked when teachers asked, “How are things going?” or “Do you want to talk about it?”. It gave them the impression that they “could tell the teacher what is going on in your life”.

## **3. Dimension of professional skills**

The last theme deals with the necessary professional skills of the teacher. The skills include competencies and rules of conduct that are generally applicable in the context of higher education. Some entail specifications regarding the digital learning environment.

### ***3.1 Conflict-solving skills***

The first code within the professional skills theme concerns strategies to resolve conflicts and their effectiveness. Conflicts in this context are interpersonal, either between multiple students or between students and teachers. Either way, it became apparent that the students wanted their teachers to be capable of resolving the conflicts fast and in an appropriate setting and manner. Even though multiple students reported having problems in the first place recalling any conflicts, there were some examples of the teacher’s role in conflict solutions. The opinions about to what extent the teacher should intervene varied between students. According to some students, teachers should best “diffuse the situation by talking to both the students”, “being a mediator”, and “not pick sides”. However, a different student expected the teacher to take further authoritative actions. The student criticised a teacher’s conflict-solving approach with a group member that did not contribute to the project:

The teacher’s role was to warn him. That was really lame, though. It was just like saying the obvious like he is not allowed to miss classes and he should do better next time. And that those behaviours are not accepted, and then the student’s role is to obey and say, yeah, it will not happen again. And then the teacher’s role would normally to be maybe more

consequent or punish the student more. But he was really accepting and conflict shy, like he did not want to have a conflict. So, the teacher avoided the conflict sort of and did not really do much like he said the same things that we did too, and it did not really help.

The student clearly explains their disappointment with the course of action taken by the teacher. The student found it inefficient that the teacher refrained from punishing the student.

In the context of conflict, students often mentioned scheduling private conversations with the students involved in the problem. So that it “only bothers the person that caused the conflict rather than the entire class.”

### ***3.2 Expertise***

Expertise in the digital learning setting involves more than the competency of teachers within the subject they are teaching. It mainly focuses on technological skills. Most students commented on teachers' ability to create a pleasant digital learning atmosphere which entails eliminating disruptions. Lacking expertise in any domain was considered unprofessional and formed a barrier between student and teacher. In contrast, remarkable expertise could strengthen the student-teacher relationship. Providing good explanations that are difficult to retrieve online is a vital feature of content expertise. Teachers are supposed to be confident in what they are teaching so the students can follow them. For the given context, students emphasised that the teachers should know “how to use the technology”, for instance, “to set up the camera and microphone correctly and not forgetting to record the lectures”. Moreover, students wanted their teacher to know how “mute everyone and not give them the option to disrupt the class” When teachers “struggled with sharing screens or putting up slides and then audio or visual errors and stuff like that”, it was considered disruptive. The lack of basic technology skills was described as “off-putting”, particularly when shown by “computer science professors”. On the other hand, “when the teacher knows really the topic like really can explain it is so good and make it so understandable” facilitates the students to follow the subject and “enjoy listening to the teacher”.

### ***3.3 Mutual respect***

Lastly, it became apparent that the professionalism of the teacher and student can be shown by acting respectfully. Respect can be demonstrated by acknowledging others' opinions and status and treating them politely. When the teacher lacks respect towards the students, they lose respect for the teacher and vice versa. Missing respect results in conflict and harms the student-teacher relationship. Hence, maintaining respect even when treated disrespectfully is desired.

A student praised his teacher, who “handled it very well and was not visibly mad” when he received racist comments from a student. Another example of respectful treatment is taking turns speaking without interrupting each other instead of using “verbal violence” and “screaming at a student”. One student stated:

Students feel like they are the smartest or know it better than the teacher. I think that it is inappropriate just to take the opposite role. It is important to stay in the student role to keep a balance because it is disrespectful to make the teacher feel like he is not a teacher really.

The statement highlights that the code applies to how a teacher and students should behave.

**Table 2**

*Coding scheme*

Theme	Code	Frequency	Definition	Excerpt
Dimension of support	Engaging with students	52	The interactive teaching methods that affect students' participation.	“But supportive, like when you do actually like involve people, ask whether people have questions, answer those questions. Try to use their own environment like even though it was a bit shitty. That they use the environment to the best of their abilities like they actually still try to get the fun a good lecture even with the distance.”
	Autonomy of the student	21	The students' freedom and responsibility regarding their academic participation and, thus, academic success, which relates to the satisfaction of their	“Sometimes what encouraged me personally to work hard during group work tutorials. It was when we were finished with our group work, and we had everything or handed it already or they looked over it.

			current academic and personal needs.	And that we can then just leave early because there wasn't an on-campus thing where you could say, no, you cannot leave."
Availability of the teacher	20		The importance of teacher availability in terms of frequency, responsiveness, contact methods and its effect on the students study progress	"Supportive I would say like being available a lot of times, like answering emails, because especially if you're in online settings that all you have. So being responsive and then something disruptive, I guess the opposite, not responding."
Private conversations	32		Reasons, consequences and student's perceptions of conversations one-on-one or in smaller groups with the teacher	"I think mainly when they talk specifically to you, so when they joined our break-out rooms, or something and you really got to talk to them personally."
Feedback	15		The form and effect of feedback that the teacher gives or receives	"also want to know what they could do better, so that you feel better supported."
Dimension of affect	Non-verbal communication	15	Technological requirements and the impact of emotion conveyed through body language	"So you just want to talk, express what you're feeling. You don't see really how the other persons react. You kind of do but you don't see their body."
Showing interest in the students	22		Student's impression of questions about their current	"When they give you the feeling they are very interested in how you feel and how you

			feelings, thoughts and worries	perceive the situation at the moment.”
Dimension of professional skills	Conflict-solving skills	33	The approach and effectiveness of conflict-solving strategies applied by the teacher	“being the mediator and understanding the problem and trying to solve as efficient as possible.”
	Expertise	13	Relevant competencies regarding study content and technology usage	“Fully knowing how to use technology and so. You don’t set up your right your camera or you don’t record the lecture, or you forget to do that or this or that. They would disrupt the academic life of a student.”
	Mutual respect	12	Purpose and implementation of treating students and teachers respectfully	“And it’s also everybody has their turn with speaking and you don’t really interrupt the one.”

### Main findings

The researcher discovered three themes: the dimension of support, affect and professional skills, which are relevant to student-teacher relationships in a digital setting. All themes consisted of multiple related codes.

The most frequently described theme was the dimension of support containing. The dimension of support revolves around teachers creating a supportive learning environment online. Engaging with students is the most applied code, part of the dimension support. It highlights the most crucial aspects of the student-teacher relationship. The code captured students’ desire for teachers to actively involve them in the class by utilising diverse teaching methods, addressing students directly and incorporating fun elements into the lesson. However, it also encompassed undesired behaviours, for instance, monologues or monotone presentations that may inhibit the development of a beneficial student-teacher relationship.

The second theme, the dimension of affect, focused on the emotional aspects of the student-teacher relationship. It stresses the importance of non-verbal communication to express emotions and the display of interest in students. Regarding this dimension, students valued enthusiastic and kind teachers genuinely interested in their well-being. However, the dimensions noted restrictions due to the reduced visibility of non-verbal cues in a digital setting.

The third theme, professional skills, listed the necessary competencies of teachers to create a positive connection with their students. Conflict-solving skills, such as mediating and diffusing conflicts, were essential to students. In contrast, a lack of authoritative action was considered ineffective. Teachers need expertise, particularly in utilising technology. Finally, mutual respect was mentioned the least by the participants. But the reports still emphasised how it contributes to a balanced relationship between student and teacher.

Comparing the dimensions of previous models to the content of the themes captured in their codes, overlaps became apparent (see Table 3). When dimensions of one model would overlap with all codes, they can be considered to explain the data found fully. Tormey's model only explained seven out of ten relevant codes, and the second model contained eight out of ten aspects. However, examining the overlaps on a dimensional level reveal that all identified themes share similarities with the dimensions. The codes Engaging with Students, Autonomy of Students, Non-verbal communication, and Expertise are each covered by one dimension from prior studies. Other codes have two overlaps each. Interestingly, the closeness dimension includes more than half of the codes, thus summarising the highest number of findings of the present studies. The attachment, assertion, and conflict dimensions only matched two codes each. The closeness dimension overlaps with both codes of affective dimension. The attachment dimension only overlaps with the dimension of support, and the assertion dimension only overlaps with professional skills, but they do not cover the whole theme.

**Table 3**

*Overlap between the identified dimensions and the dimensions known from Tormey<sup>1</sup> (2021) and Vagos & Carvalhais<sup>2</sup> (2022)*

Themes and their codes	Dimensions				
	Affiliation <sup>1</sup>	Attachment <sup>1</sup>	Assertion <sup>1</sup>	Closeness <sup>2</sup>	Conflict <sup>2</sup>



---

 Support

Engaging with students	x		
Autonomy of the Student			x
Availability of Teacher		x	x
Private Conversation		x	x
Feedback	x		x

## Affect

Non-verbal communication			x
Showing Interest in Students	x		x

## Professional skills

Conflict-solving skills	x	x	
Expertise			x
Mutual respect		x	x

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**Discussion**

Generally, this study aimed to understand better which dimensions constitute a beneficial student-teacher relationship in the distance learning at the University of Twente. This study found three themes: support, affect and professional skills. Additionally, the study aimed to identify which dimensions of the three-dimensional model of Tormey (2021) or the two-dimensional model of Vagos & Carvalhais (2022) apply to student-teacher relationships in higher education's digital learning. All dimensions of both models became evident, but none of the themes fully matched the description of any pre-existing dimensions. The last research

question was to check for potentially new dimensions. The comparison of models and the themes did not indicate the existence of entirely new dimensions. The composition and specific implications of dimensions may differ.

The models of Tormey (2021) and Vagos & Carvalhais (2022) can explain the discovery of the themes and their codes. The affiliation, attachment, closeness and conflict dimensions explain the implications of the dimension of support (Tormey, 2021; Vagos & Carvalhais, 2022). On the one hand, the three-dimensional model includes social interaction, the main criterion of student-teacher relationships, which is engaging with students (Tormey, 2021). Furthermore, the model emphasises that teachers should be reliable, illustrated by frequent availability and enter into private conversations so students can confide in the teacher. The teacher can show their care through feedback moments and inquiries about student well-being. On the other hand, the two-dimensional model of Vagos & Carvalhais (2022) captures the need for feedback, teacher availability and student autonomy in the teacher's resourcefulness characterised by regularity and accessibility. The necessity of communication between students and teacher points to private conversations.

Compared to the dimension of support, the dimension of affect is more compact. The closeness and affiliation dimension can simply explain the dimension of affect (Tormey, 2021; Vagos & Carvalhais, 2022). Closeness stresses the importance of emotional exchange through non-verbal communication and the teachers' responsibility to know and thus show interest in their student's well-being (Vagos & Carvalhais, 2022). Affiliation uses a slightly different formulation stating that teachers should care about student well-being.

Professional skills are the sole theme of student-teacher relationships that address aspects of assertation (Vagos & Carvalhais, 2022). Moreover, dimensions such as affiliation, closeness and conflict further support the relevance of professional skills (Tormey, 2021; Vagos & Carvalhais, 2022). The three-dimensional model points out the relevance of power dynamics and social status that, combined with the teacher's goodwill, contributes to efficient conflict-solving. It further specifies that emotions such as anger and humiliation damage the student-teacher relationship; therefore, respecting each other is important. Vagos & Carvalhais (2022) confirmed the need for expertise based on the teacher's aim to be competent. Moreover, a lack of respect increases conflict levels, making it more difficult for the teacher to deal with the student.

To summarise the first key finding, all themes and codes align with previous literature emphasising their importance for the quality of student-teacher relationships in higher education and digital learning. Previously, the implications were only clarified for each context separately, but combining higher education and digital learning changes the specific characteristics of beneficial student-teacher relationships. A positive student-teacher relationship emerges when the teacher sufficiently supports students in their learning process, demonstrates the necessary professionalism in his teaching and indulges in affective aspects such as moods or attitudes.

The second key finding answered whether one or the combination of the pre-existing models Tormey (2021) and Vagos & Carvalhais (2022) sufficiently describes the identified dimensions. No model alone supported the findings. Both models define student-teacher relationships only in higher education or digital learning; therefore, their context did not perfectly correspond with the context of the present research. But the dimensions of both models covered all relevant characteristics of student-teacher relationships in higher education's digital learning. This key finding suggests that the constitution of student-teacher relationships can be derived from similar contexts. Moreover, the adopted model of Vagos & Carvalhais (2022) is not using an outdated definition as the present and their results the relevance of the closeness and conflict dimensions. However, it is unclear if models can be combined to define student-teacher relationships in higher education's digital learning or whether a new model must be created. Some dimensions of the two models captured the same aspects of student-teacher relationships, impeding their exclusiveness. Dimensions that are not exclusively applicable are more complicated to assess. Therefore, it is recommended to determine the substantial overlaps between the models to identify distinct dimensions that could form a new model integrating all relevant information on student-teacher relationships in the digital learning of higher education.

The last key finding indicates that the characteristics of beneficial student-teacher relationships are relatively stable across similar contexts. The dimensions of the student-teacher relationship in higher education may be named differently, and their structure may deviate when comparing conceptualisations in different studies. But the condensed model by Tormey (2021) almost entails all of the implications for student-teacher relationships found in the data. The only aspects not represented in the three-dimensional model were the student's autonomy, non-verbal communication and expertise. Their content is consistent with the model of Vagos & Carvalhais (2022), indicating that their relevance is bound to the digital learning context. Asynchronous

features implemented in digital learning make the ability to responsible self-study more relevant, which this study describes as student autonomy (Fabriz et al., 2021). The importance of non-verbal communication in digital learning lies in its clarification quality for general communication between student and teacher, which reportedly is essential for solving challenges that usually occur in digital learning (Xiao et al., 2023). Lastly, a study highlighted that technical proficiency is an expertise that teachers do not necessarily possess (Fabriz et al., 2021). The lack of completely new dimensions indicates that more or less the same aspects constitute student-teacher relationships in different contexts; their concrete implications require adaptation to the conditions of each context. The additional context of digital learning only introduced new aspects to student-teacher relationships in higher education than making any aspects redundant. This insight is vital as it highlights the need to understand and address digital learning environments' unique challenges and opportunities while still recognising the foundational elements of effective student-teacher relationships. With this knowledge, teachers can make informed decisions and tailor their approaches to foster positive and meaningful interactions with their students that take into account all contextual implications.

Despite careful consideration of the study's design, certain limitations apply to the findings that future research can address. First, the convenience sample created a participant group that is not representing the whole student community making it less generalisable. The participants were only representative concerning gender. The distribution of nationalities and types of studies was uneven, with some study programmes unintentionally not being included. Since most participants were studying psychology, the generated impression of expectations for positive student-teacher relationships may not apply to other studies. A previous study revealed that psychology students value the more personal connection between them and the teacher than business students (Sander et al., 2000). The discrepancies indicate that it might be necessary to assess student-teacher relationships depending on the study programmes. Nonetheless, the study also noted that overall there more similarities than discrepancies in expectations towards student-teacher relationships across study programmes. Consequently, the generated results still serve as a general representation of student-teacher relationships in digital learning of higher education. Future research could explore the specific differences between study programmes for this context. Moreover, a replication study with a more extensive and representative sample could increase the external validity.

A second limitation concerns the reliability of some results. The repetitive discussion about the coding scheme with other researchers ensured intercoder reliability. Therefore, the results describing the themes and codes should be sufficiently reliable. However, only one researcher compared the models of Tormey (2021) and Vagos & Carvalhais (2022) to the discovered dimensions. Whether a second researcher would identify the same overlaps is unclear. The overlaps are thus subjective and not necessarily replicable. Moreover, identifying dimensions of the known models in the data can be more effectively done with a deductive approach, especially since prior and current research showed the applicability of the dimensions for student-teacher relationships in digital learning and higher education. Hence, replicating the study with multiple researchers and using the dimensions as pre-defined themes would help assess the results' reliability.

Regardless of the limitations, the three identified dimensions indicate possible approaches to promote university student well-being in digital learning. Sending the dimensions with the allocated codes to the person responsible for the well-being programme at the University of Twente can stimulate a collaborative developing process for new interventions. For example, teachers could be trained in the most engaging methods for students, focusing on creating fun lessons with serious games. Moreover, another recommendation is to apply assessments of teachers' technological competencies and offer workshops to improve the teachers' skills. Teachers could also send out evaluation surveys at the end of a course in which students can give feedback on their performance as a teacher. Teachers can apply this feedback to continuously improve and be aware of the current needs of the students. Lastly, teachers could be motivated to learn ways to strengthen the student-teacher relationship. All these possible implications allow the student's well-being to thrive and enhance their academic success, which is beneficial for the reputation of the University of Twente.

This study identified the dimension of support, affect and professional skills as criteria for beneficial student-teacher relationships in higher education's digital learning. Both existing models, the three-dimensional model of Tormey (2021) and the two-dimensional model of Vagos & Carvalhais (2022), partially explain the student-teacher relationship in the given context. The two models support the existence and relevance of dimensions resulting from the present study with no newly revealed dimensions. Student-teacher relationships are thus more resembling in their content in various settings than previously assumed. However, the present

study provided insights into the detailed conditions that are helpful in tailoring techniques to form positive student-teacher relationships in the digital learning of higher education. The consistency of the findings with the literature outweighs the study's limitations regarding the representativeness of the sample and the objectivity of the dimensions' comparisons. The future focus should lie on utilising the findings to promote student well-being. The present study enhanced the understanding and highlighted the importance of developing a summarising model of student-teacher relationships for digital learning in higher education, which is crucial for applying the relationship dimensions in interventions to protect student well-being.

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## Appendix A

### Interview Guide

#### Introduction

To start off, I would like to thank you for taking the time to do this interview with me today. But before we start, I want to give you some more information about the interview. The overall topic focuses on the effect of student-teacher relationships on student well-being in higher education. Student well-being means ‘the optimal psychological experience and functioning’ of a student (Deci & Ryan, 2008, p. 1). The interview is part of a research conducted by five students (Hanna, Lea, Linnea, Maike and Viola).

The aim of the interview is to gain new insights and to answer multiple research questions. According to the research questions, the interview is divided into the following subtopics: Student-teacher relationship in distance learning, the current barriers to form a beneficial student-teacher relationship perceived by students, students perception of teachers displaying emotions... . I will tell you every time when we begin with a new topic.

In order to conduct the interview, we ask you to sign the informed consent which I will send you now. By giving your signature, you agree to all terms mentioned within the informed consent. The interview will be consequently recorded to later on transcribe and analyse the responses. The transcript can only be accessed by the research group and the two supervisors. Your data will be treated anonymously, meaning all information allowing to identify you as a person will be removed. In case that you feel uncomfortable with answering any questions or with your answers being used for this research, you can withdraw from the study at any point.

Please keep in mind that there are no correct or incorrect answers, as we are curious about your personal experience and thoughts. Do you have any questions regarding the information given verbally and written? If not, I would kindly ask you to send me the signed version of the informed consent form back. I will start the recording now.

#### ***Personal background:***

1. How old are you?
2. What is your nationality?
3. What is your gender?
4. What do you study?

***Now we come to the last part of this interview. The following questions are meant to generate new insights into the student-teacher relationship in the online-setting.***

***Therefore, please keep in mind that you should answer the questions with your experience during distance learning. (Viola)***

1. What aspects do you perceive as supportive or disruptive for the student-teacher relationship in an online setting?
2. What helped you have the feeling that your teacher took care of you?

3. When you felt the most connected with the teacher's online class, which aspect enhanced this feeling?
4. When being taught online, what else helped you stay engaged? Try to give specific examples.
5. When conflict occurred in online class, what was the role of the students and the teacher? Please explain in this context how the roles affected the student-teacher relationship.
6. How would you like conflicts to be addressed by a teacher in online class?

***General probes:***

1. Nodding, verbal affirmation.
2. Can you think of a specific situation?
3. Could you give an example?
4. Please elaborate.

## Appendix B

### The Informed Consent Form

#### *Opening Statement*

You are being invited to participate in a research study titled This study is being done by Hanna, Lea, Linnea, Maike, Viola from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

The goal of this research study is to gain new insights into the student-teacher relationship and its relation to student well-being. We are going to conduct interviews which will approximately last XX minutes. The information will be recorded, transcribed, and then analysed.

You can voluntarily discontinue participating in this study at any time. Any question may be omitted if you choose.

Our analysis indicates that there are no known risks associated with this research topic. Your responses to this study will, as much as possible, stay private. We will lessen risks by safely storing the data on a private disc as opposed to a shared drive. The transcription that will be created for this interview will only be read by the members of the study group and the teaching staff. The data will be made anonymous by removing names, dates, and places. The potential quotes will also all remain anonymous for the purposes of the report. After the XX.XX.XXXX all the data will be destroyed.

Study contact details for further information:

Hanna Foerst ([h.m.foerst@student.utwente.nl](mailto:h.m.foerst@student.utwente.nl))

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Linnea Seliger ([l.seliger-1@student.utwente.nl](mailto:l.seliger-1@student.utwente.nl))

Maike Kastrian ([m.k.kastrian@student.utwente.nl](mailto:m.k.kastrian@student.utwente.nl))

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**Consent Form**  
**YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM**

*Please tick the appropriate boxes*

**Ye  
s    No**

**Taking part in the study**

I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves participating in an audio-recorded interview, which will be transcribed as text.

**Use of the information in the study**

I understand that information I provide will be used for this specific study I was informed about.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my information can be quoted in research outputs

**Consent to be Audio/video Recorded**

*I agree to be audio/video recorded. Yes/no*

### Future use and reuse of the information by others

I give permission for the answers in the recorded interview that I provide to be archived in the personal computer of the researcher so it can be used for future research and learning. Every personal information will be anonymised or removed depending on the significance of the information.

I give the researchers permission to keep my contact information and to contact me for further questions if necessary.

### Signatures

\_\_\_\_\_  
 Name of participant [printed]                      Signature                      Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands what they are freely consenting.

\_\_\_\_\_  
 Researcher name [printed]                      Signature                      Date

### Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by [ethicscommittee-bms@utwente.nl](mailto:ethicscommittee-bms@utwente.nl)



