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Rethinking student-teacher relationships in higher education: a multidimensional approach

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Abstract
Student-teacher relationships play an important role in both teacher and student experiences in higher education and have been found to be linked to learning, classroom management, and to student absenteeism. Although historically conceptualised in terms of immediacy or distance and measured with reference to behaviours, the growing recognition of the role of emotions and of power—as well as the development of a range of multidimensional models of social relationships—all suggest it is time to re-evaluate how student-teacher relationships are understood. This paper develops a theoretical model of student-teacher affective relationships in higher education based on three dimensions: affection/warmth, attachment/safety, and assertion/power. The three-dimensional model was tested using the Classroom Affective Relationships Inventory (CARI) with data from 851 students. The data supported the use of this multidimensional model for student-teacher relationships with both two- and three-dimensional models of relationships being identified as appropriate. The theoretical development of a multidimensional model and the empirical development of an instrument with which to explore these dimensions has important implications for higher education teachers, administrators and researchers.

Keywords Emotion · Student-teacher relationships · Higher education · Immediacy · Care · Power

Introduction

Student-teacher relationships are an important feature of the higher education learning environment and have long been the subject of considerable interest. Forty years ago, Anderson (1979) identified that teacher immediacy was predictive of the quality of college students' course experience, while Boice (1996), in his landmark study of higher education

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classroom management, argued that students' classroom misbehaviour is, in part, a function of the kinds of immediacy that teachers display (1996, p. 464). Student-teacher relationship has also been found to have an impact on absenteeism in higher education settings (Rocca, 2004), and Witt et al. (2004) found a strong correlation between teacher immediacy and affective learning (r = .49) and a weak correlation with cognitive learning (r = .17). Over recent years, the focus of research has also shifted towards the role of emotions in higher education student-teacher relationships, with research highlighting a range of student emotional reactions in class, including hope, enjoyment, pride, shame, boredom, hopelessness, anxiety, and anger (Mazer et al., 2014; Quinlan, 2016). Positive emotions such as hope have been found to be associated with college GPA (Snyder et al., 2002), while emotions like enjoyment and pride have been found to be linked to performance on midterm exams (Pekrun et al., 2006). Titsworth et al. (2010) have found that positive emotions were strongly associated with both students' ratings of their perceived learning, and their use of cognitive processes likely to give rise to learning. It is hardly surprising then that Titsworth et al. (2013) would characterise emotions as "knowledge-producing resources" and argue that "emotions are viewed as essential resources that both enable and constrain the learning experiences of students and teachers" (2013, p. 192–193). Overall, then, there is good reason for seeing the emotional dimensions of student-teacher relationship as an important aspect of life in higher education.

Yet, while it is clear the student-teacher relationships are important, it is less clear how these relationships should be measured and conceptualised. Three issues arise with pre-existing studies which look at the emotional quality of student-teacher relationships in higher education. First, many of those working from a communication studies perspective (e.g. Alt & Itzkovic, 2019; Boice, 1996; Witt et al., 2004) describe these relationships in terms of teacher behaviours that can be interpreted in terms of immediacy. But there is a growing recognition in the wider literature that it is not the teacher behaviour itself which should be the focus of attention but rather the emotional response to that behaviour by the student. Second, many of these studies are underpinned by a notion of valence or "closeness" which is understood as being measured along a single continuum ranging from positive/close to negative/distant. So, while Titsworth et al. (2010) use a multi-dimensional scale to assess emotional valence, support, and work, and Marsh's SEEQ (Marsh, 1982) distinguishes between two emotional dimensions of enthusiasm and rapport, the emotional quality of the student-teacher relationship itself is understood as being located along a single continuum ranging from positive/close to negative/distant. The use of a single dimension of valence or immediacy in this way has value, but it also may hide important aspects of teaching relationships. For example, a teacher who surprises students with an unexpected mid-term exam may generate negative emotions in students just as much as a teacher who is perceived as incompetent in their subject area, but these two situations have important differences between them and the simple classification of emotional experiences as being "positive" or "negative" may, therefore, hide a great deal of important information. The third issue which arises with a number of these studies is that they do not consider the interplay between the emotions of student-teacher relationship and the cultural and social organisation of interaction in the university. Indeed, students feelings towards teachers do not simply arise from teacher behaviour but also depend in part on intergroup stereotypes (Cuddy et al., 2007) and implicit biases (Nosek et al., 2002). As such, teacher and student ethnicity and gender may help to shape the emotional quality of students' responses to teachers. In addition to mapping the emotional quality of student-teacher relationships in more complex ways, we also may need to situate research work on these relationships in more socially aware ways.

The goal of this paper is to describe an approach to thinking about student-teacher relationships in higher education which (a) moves beyond a focus on teacher behaviour and instead deals with the emotional quality of student-teacher relationships, and (b) which is parsimonious enough to provide useful information to higher education teachers without, at the same time, reducing all emotions to a measure of valence. The paper also aims to locate an analysis of the emotional quality of student-teacher relationships within the context of an understanding of the social and cultural dimensions of such emotional appraisals.

In this paper I will first describe the ways in which student-teacher relationships have been understood and researched. Following on from this I will describe the development and testing of the Classroom Affective Relationships Inventory (CARI). This instrument has the potential to change our understanding of what is happening between teachers and students, to aid researchers aiming to understand the ways in which student-teacher relationships impact on learning, student experience, student absenteeism, and classroom incivility, and to help professors and lecturers better understand how to manage these relationships in their classes. In the final section, the findings from the use of CARI will be discussed in the context of the cultural and organisational structures of higher education institutions.

Conceptualising and measuring student-teacher relationship in higher education

In higher education settings, the question of student-teacher relationships has often been viewed from the point of view of teacher immediacy, defined as "the extent to which the teacher gives off verbal and nonverbal signals of warmth, friendliness, and liking (e.g. forward leans, smiles, purposeful gestures, and eye contact)" (Boice, 1996, p. 458). As Goodboy and Myers note (Goodboy & Myers, 2009), most research on higher education immediacy has focused on measuring it with reference to teacher behaviour, including appropriate touch, eye contact, vocal expressiveness, forward leaning, and straight posture. The "perceived non-verbal immediacy scale", for example, asks students to rate the frequency with which the teacher demonstrates particular behaviours such as smiling at the class, moving around the class, and having a very relaxed body position (Thomas et al., 1994). More recent measures (e.g. Alt & Itzkovic, 2015) similarly focus on observable behaviours. This focus on behavioural indicators poses certain difficulties when one seeks to move student-teacher relationship research to an international or cross-cultural context. Non-verbal behaviours like making eye contact or standing close to another person may be interpreted differently by students and faculty members from different cultural settings. Beyond this, the extent to which particular forms of physical distance may be seen as appropriate or inappropriate in faculty-student relationships may also differ from culture to culture (e.g. Hofstede & Hofstede, 2005).

Beyond this, there is also a growing recognition that it is probably not the behaviour itself, but the emotional quality of that relationship that should be the focus of attention. It is this emotional appraisal of behaviour that is often at the heart of research which explores student-teacher relationships from a more sociological and qualitative perspective. Hargreaves (2001) introduced the concept of "emotional geographies" to describe the way in which emotions provide information on closeness of relationships: emotional geographies are defined as "the spatial and experiential patterns of closeness and/or distance in human interactions and relationships, that help to create, configure, and colour the feeling and emotions we experience about ourselves, our world, and each other" (2001, p. 1061). For Hargreaves, emotional

distance is problematic in that it serves to "threaten the emotional understanding that is foundational to high standards of teaching and learning" (Hargreaves, 2001, p. 1075). His data, which is based on teacher interviews, highlights that working with learners was a source of both positive and negative emotions for teachers. Among the factors identified by his respondents as important were a sense of care (Noddings, 1988), a sense of warmth, and a sense of empowerment.

While it has been stated that there are very few studies on the emotions of student-teacher relationships in higher education (Walker & Gleaves, 2016), in the 1990s, an "emotional revolution" (2003, p. 328) took place in psychology and sociology, and by the turn of the century this gave rise to a literature which started to highlight the importance of emotions to students' experiences of teaching and learning. Walker et al. (2006) suggest that changes in the demographics of higher education have made faculty sensitivity and empathy more central to the faculty role. Beard et al. (2007) identified a range of student emotions expressed, including hope, loss, worry, fear, loneliness, frustration, pride, and excitement. Beard et al. highlighted the centrality of relationships to understanding the link between emotions and learning, while Moore and Kuol (2007) identified how students' descriptions of good teaching made reference to love, passion, exhilaration, compassion, empathy and care. As at other educational levels, there is also a recognition that relationships in teaching can be difficult for teachers, with research on university teacher emotions identifying feelings of fear, shame, and powerlessness with increased emotional labour being required of some faculty members. These emotional experiences are also embedded within power and gendered hierarchies within universities (see, for example, Acker, 2012). But, if there is a growing awareness of the importance of emotional relationships in teaching in higher education, there is not yet a clear theory of emotional relationships that might help move the conversation from personal preferences and opinions to a solid grounding in theory or evidence (Quinlan, 2016, p. 105).

Alongside, more qualitative and descriptive work there have also been a number of attempts to develop quantitative tools for measuring the emotional quality of teaching and learning relationships in higher education. Among older tools, Marsh's (1982) Student Evaluation of Educational Quality (SEEQ) contains a scale—called teacher rapport—which measures aspects of the emotional quality of class relationships. Teacher rapport is measured on a single dimension and includes items for teacher friendliness, accessibility, and interest in students. Titsworth et al. (2010), drawing on Emotional Response Theory, developed a more comprehensive three-dimensional Classrooms Emotions Scale (CES) aimed to measure (a) the emotional valence which the student experiences in teaching (positive to negative), (b) the emotional support the student feels, and (c) the emotional work done by the student. While all three scales address aspects of the emotional environment of teaching and learning, only the "valence" scale directly addresses the emotions experienced in the teaching and learning relationship, and this is based on just two items which measure only the "positivity" of the emotional experience ("I would generally describe the emotions towards this class as positive" and "I would generally describe the emotions I feel towards my instructor as positive" [2010, p. 439]). Trigwell (2012) focused attention on teacher emotions and used measures which combines experienced emotions with behaviours and contexts (examples include. "If something I design hasn't worked in class I feel annoyed" and "I am embarrassed when my planned learning activities appear to fail" [2012, p. 618]). Using this scale, he identified five dimensions of teachers' emotional experience: motivation, embarrassment, frustration, anxiety, and pride. However, the mixing of emotional descriptions with contexts and behaviours is somewhat problematic. For example, the two items listed above both emerged on the same

scale but it is not clear if the covariance is due to the nature of the emotions experienced (embarrassment and annoyance) or due to the context described (planned learning activities fail). Trigwell's instrument has also been criticised as not being sufficiently grounded in a coherent theory of emotion (Hagenauer & Volet, 2014, p. 243). White (2013) takes a different approach, listing sixteen different emotions and asking students how often they had experienced these emotions in courses that they had taken. Based upon this, White identified three scales; positive emotions (examples include enjoy, happy, engaged), passive negative emotions (e.g. stress, worried, scared), and activating negative emotions (e.g., annoyed, angry, disappointed). This model focuses very clearly on the emotional quality of the students' experience. The emergent model is, however once more, dominated by a sense of valence (positive and negative emotions) and does not have a well-developed underlying theory of emotions in social relationships.

Outside of higher education, other instruments have also been developed to look at student-teacher relationships. The Questionnaire on Teacher Interaction (QTI) (Wubbels & Brekelmans, 2005) is one such quantitative tool and is based upon the idea that student-teacher interactions can be mapped in terms of two-dimensions: dominance-submission, and opposition-cooperation. Although the QTI has been adapted for higher education settings (e.g. Kendall & Schussler, 2013), it is based on describing teacher behaviour and is not a measure of affective student-teacher interaction. A second multidimensional approach to student-teacher relationships sees these relationships as being characterised by closeness, independence/dependency, and conflict, and is measured by the Student-Teacher Relationship Scale (STRS), (O'Connor, 2010; Pianta, 2001; Rey et al., 2007). The applicability of this model with older children has however been questioned (Koomen et al., 2012) and its suitability for the nature of relationships that exist in higher education is doubtful: for example, items in the short form of the STRS include "If upset, the child will seek comfort from me".

The emotional quality of relationships cannot be separated from the social appraisals and implicit beliefs which colour each person's perceptions of others and so it is useful to also consider multi-dimensional models from other work describing social relationships. For example, research on social perceptions suggests that our perceptions of others can typically be modelled on two dimensions: warmth and status/competence (Fiske et al., 2002; Fiske et al., 2007). While these perceptions can be construed as being "cognitive" appraisals, to separate these appraisals from emotion is to ignore the ways in which emotions are "multi-component responses to challenge or opportunities" (Oatley et al., 2006, p. 29), in which cognitive processes are intertwined with biological and which are experienced in part through patterns of thought-action tendencies. Indeed, Cuddy et al. (2007) identify that emotions such as admiration, pride, contempt, envy, disgust, and pity locate us with respect to others along these dimensions. Similar multidimensional approaches emerge from work on assessing students' assessment of instructor's credibility: McCroskey and Teven (1999) propose that credibility can be thought of in terms of three dimensions, namely competence, trustworthiness, and goodwill. This model has been applied to higher education settings (Neville Miller et al., 2014).

While these range of different ways of conceptualising relationships come from different research traditions (social cognition, attachment theory, clinical psychology, emotional response theory, and communication studies) and, indeed, aim to explain different things (ranging from rapid social appraisals to significant social relationships), a number of common features do seem to emerge that may help to frame a conceptual

model for student-teacher relationships in higher education. It is notable, for example, that some dimensions appear across a range of models (for example, warmth/closeness/goodwill). This raises the question as to whether some coherence can be fashioned from these diverse strands.

Three dimensions of student-teacher relationships

A synthesising framework for these diverse strands can be found in the work of Jennifer Jenkins and Keith Oatley (see for example Oatley, 2004, p. 81) who argue that emotional-social distance between people is generally experienced in terms of whether relationships give us a sense of Affiliation (warmth/affection), Attachment (safety/security), and Assertion (position within a social hierarchy) (Fig. 1).

Affiliation/warmth Also referred to as affection, warmth, liking or love, this dimension can be thought of as the foundation for social living. Warmth and friendliness are at the heart of the idea of "immediacy", linked to the "cooperation" dimension on the QTI, "closeness" on the STRS, and "goodwill" for McCroskey and Teven (1999). For Hargreaves (2001), it is part of what is in the concept of "care".

Attachment/security Alongside warmth, a feeling of security and trust in another person is also important in pedagogical relationships—where students feel anxiety or some degree of

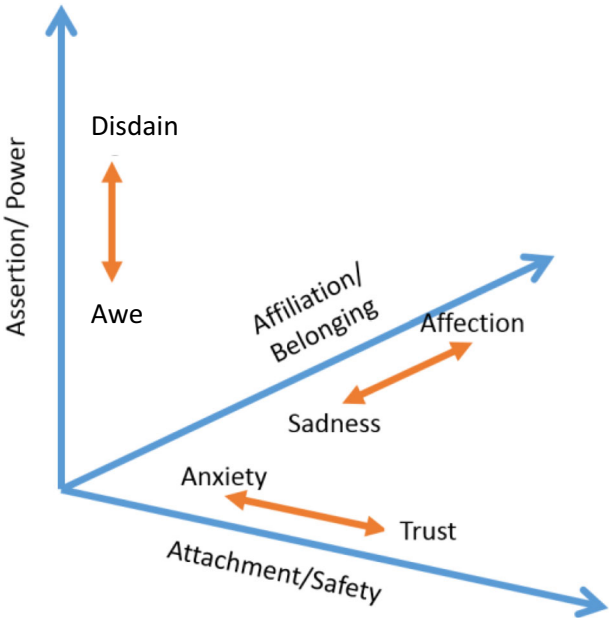

Fig. 1 A three-dimensional emotional space (adapted from Oatley et al., 2006, p. 229). Note: Although the three dimensions are represented in Fig. 1 as orthogonal for ease of visualisation, there is no requirement that the three dimensions are at 90° to each other in practice. In the original, the emotions displayed on the Assertion axis were "Shame" and "Anger". These have been replaced here with emotions more closely linked to the status dimension of power (Disdain and Awe)

fear about the teacher they are probably less likely to learn. `For McCroskey and Teven (1999) "trustworthiness" (attachment) is distinct to "goodwill" (affiliation). In other models, however, attachment and affiliation are collapsed into each other, such as in the dimensions of "cooperation" on the QTI and in the "warmth" dimension for Fiske et al. (2007). Oatley et al. (2006) suggest that this may reflect a western cultural bias: while western researchers tend to conflate attachment and affiliation (that is, they tend to work on the basis that people who make us feel liked will also make us feel secure), others identify that affiliation and attachment should be thought of as a separate dimension of social-emotional relationships (Goldberg et al., 1999). To take an educational example, it is possible to imagine a professor that students think of as fair and trustworthy (high attachment) but who does not communicate warmth or liking to the same students (low affiliation).

Assertion/power/status In addition to these two dimensions which emerge from the psychological attachment literature, Oatley et al. identify that emotions also play a role in the kind of social dimension that is often of more interest to sociologists—that of power or status (e.g. Kemper & Collins, 1990). The emotions at interest here are emotions such as awe, anger, and shame. In existing models, empowerment is identified as an important aspect of student-teacher relationships for Hargreaves (2001) and was central to teacher incivility for Alt and Itzkovic (2019). In the QTI, it is represented in terms of dominance-submission. Fiske et al. (2007) identify "competence" judgements as representing "status" which (alongside organisational or political position and social class) has been identified as one of the dimensions of power as far back as the sociology of Max Weber—in more contemporary sociological terms "status"can be seen as a recognition of the possession of embodied cultural capital (Bourdieu, 1986). Feelings of awe and admiration (and perhaps envy) locate the person experiencing the emotion as being in a lower position with respect to another on a status or embodied cultural capital dimension.

For the first two dimensions, greater closeness might be regarded as pedagogically useful. Hence, we might hypothesise that greater perception of warmth and safety would be valued by students. For the third dimension, however, it seems more likely that students would value status distance rather than status closeness. Therefore, we might hypothesise that on this dimension, greater feelings of awe or respect would be valued by students.

This three-dimensional conceptualisation for student-teacher relationships is potentially a very useful development in the understanding of classroom dynamics in higher education. In comparison to the older behavioural work on immediacy, it has the potential to be more cross-culturally valid (something which is of practical as well as conceptual relevance in a time of growth in international student mobility) and to focus attention on the emotional quality of students' experience rather than on teacher behaviour, a topic which is increasingly identified as crucial in understanding higher education teaching (Quinlan, 2016). The three-dimensional model also has the potential to direct the attention of teachers and researchers to important aspects of relationships (such as status and security) which have either been under-emphasised or subsumed in previous work which emphasised valence and immediacy/distance. However, whether or not this three-dimensional conceptualisation of relationships is useful will depend on whether or not it can be empirically verified and whether or not it can be seen to be linked to some meaningful measure of student experience. Despite the theoretical coherence of the model as outlined thus far, it is possible that it does not match empirical reality—for example, it is possible that a one-, or two-dimensional model may be a better fit for describing these relationships. The next sections of this paper will, then, describe the Class Affective

Relationships Inventory (CARI), a survey instrument designed to rapidly assess students' perceptions of the emotional quality of the relationships with teachers in higher education.

Methodology

Materials

The CARI is a 15-item questionnaire based on a 7-point scale covering the three dimensions of student-teacher relationships. The emotional relationships items were based on the following stem question: "To what extent do you associate this course's professor with the following terms?" Fifteen terms related to the emotional quality of the student-teacher relationships were then presented, 5 which were thought to be positively associated with each of the 3 dimensions. The terms were impressive, admirable, influential, exciting, and inspiring (assertion/status), friendly, warm, compassionate, positive towards students, and caring (affiliation/warmth), trustworthy, well-intentioned, reassuring, reliable, and inspires confidence (attachment/safety). The 7-point scale ranged from "Not at all" to "Very much". A number of different approaches were piloted before arriving at this formulation, including an approach similar to that of Trigwell (2012) and one similar to that of White (2013) (both approaches were described above in the "Conceptualising and Measuring Student-Teacher Relationship in Higher Education" section). Data analysis of these pilots showed that neither approach effectively measured dimensions similar to those presented by Jenkins and Oatley. The approach ultimately chosen to assess the student perceptions of the emotional quality of student-teacher relationships draws on Fiske et al.'s (2007) work on measuring social appraisals as well as on Jenkins and Oatley's three-dimensional model. The terms used were identified through two methods. First, the work of Fiske et al. was reviewed to identify terms which they had used. Secondly a dictionary and thesaurus search was completed and a list of terms associated with "awe", "warmth", and "feeling assurance" was drawn up. The final list of terms were drawn from this list. The questionnaire was in French, which is the language of instruction in the school and the native tongue of the vast majority of students. The items were originally written in English, and translated into French by a native speaker before being verified through retranslation back into English, again by a native speaker.

Of these three scales, affiliation and attachment are more or less self-explanatory, whereas the assertion scale is the result of some decisions as to how the power/assertion scale should best be represented. As noted above, competence or status judgements reflect the embodied cultural capital (one dimension of power) of the teacher. While Alt and Itzkovic (2019) conceptualise teacher power in terms of behaviours which are perceived as non-legitimate (shouting, ignoring students, missing classes etc.), at least some of the kinds of emotions which these behaviours illicit are probably already picked up in the "safety" scale (by terms like "reliable", and "well intentioned"). In keeping with the structure of other dimensions, the status/power dimension was framed positively (using terms intended to capture the feeling of awe), rather than focusing on negative terms such as contempt. This was not straightforward to do, given that negative emotional vocabulary is often richer and more diverse than the language associated with positive emotions. However, piloting of previous iterations of the questionnaire showed that the mixing of positively and negatively valanced terms increased noise and decreased reliability in the instrument. Therefore, all three dimensions were framed in ways that could be perceived as positive by both teachers and students.

In addition to the CARI items, 4 additional questions collected demographic data about the student and 7 questions collected data about the course. A single question asked their overall evaluation of the quality of the course (agreement with the statement "Overall, I found the course to be good"). It is worth noting that student evaluations of teaching, are highly contested, may not be correlated with student learning (Uttl et al., 2017), and may also show bias, for example, against female teachers (Boring, 2017). The inclusion of a student evaluation of teaching measure here should not be read as an endorsement of the way such evaluations are commonly used in higher education. Nonetheless, it does provide useful information on the way students perceive the quality of their experience in a course.

Participants

An overview of the participants is included in Table 1. The 36 to 37% of respondents who were female constitutes a slight over-representation of female students (who make up 29% of the Bachelor cohort in the university as a whole).

Only 6 to 7% of respondents referred to courses which were taught by female teachers. This slightly under-represents female teachers within the school as a whole (women made up less than 20% of the teachers in all faculties of the university in question).

Missing data (due to students leaving an item blank) accounted for less than 4% of all responses in each of the 15 emotional variables analysed (as described above under the

Table 1 Sample descriptives, before and after removal of cases with missing values

	Before removal of cases with missing responses		After removal of cases with missing responses	
	n	%	*n*	%
Gender (of respondents)				
Female	369	36%	312	37%
Male	645	62%	525	62%
Unstated	24	2%	14	2%
Total	1038		851	
Gender (of course teacher)				
Female	67	6%	56	7%
Male	910	88%	752	88%
Unstated	61	6%	43	5%
Total	1038		851	
Year of study				
1st	640	62%	530	62%
2nd	142	14%	118	14%
3rd	208	20%	172	20%
Master	20	2%	15	2%
Unstated	28	3%	16	2%
Total	1038		851	
Class size				
Less than or equal to 20	8	1%	7	1%
21 to 50	51	5%	44	5%
51 to 100	164	16%	137	16%
101 to 200	265	26%	222	26%
Greater than 200	519	50%	430	50%
Unstated	31	3%	11	1%
Total	1038		851	

heading "materials"), an acceptable level of missing-ness. An analysis of the demographic data did not indicate any systematic missing-ness of data as can be seen in Table 1). The large sample size allowed a conservative approach to dealing with missing data: any case in which any data on the 15 emotional variables was missing was excluded from the analysis. This left 851 cases for inclusion in the analysis.

Procedure

Bachelor courses were selected and teachers were asked if they would permit questionnaires to be distributed and collected in class. Classes were selected with a view to ensuring the gender distribution of the student sample matched that of the school (i.e. on a non-random basis). In line with the ethics protocol approved by the institutional Human Research Ethics Committee, the questionnaires ensured that both teachers and students were anonymous at the point of data collection—neither the student nor the course they were referring to when answering the questionnaire were identified in the questionnaire. In order to ensure this anonymity for teachers concerned, students were asked to fill out the questionnaire thinking of a course they were taking other than the one in which they were sitting when completing the questionnaire, without identifying the course referred to. This meant that separate consent was not required from all teachers of the courses referred to by students, which in turn allowed a large student sample to be collected. However, it also meant that relatively little data about the teachers or courses referred to could be collected.

Findings

The suitability of the data for principal component analysis was first assessed. The analysis indicated the data is ideally suited for principal component analysis (KMO = .943; Bartlett's test of sphericity is significant with Chi square = 8762, df = 105, $p < 0.001$; all values on the diagonal of the anti-image correlation matrix are above .9). The determinant of the R-matrix is .00003, greater than the .00001 cut off to avoid difficulties of multicollinearity. Communalities range from .619 to .794—all comfortably above the recommended cut off for large samples of an average greater than .6 (Field, 2005, p. 655).

As Table 2 illustrates, the eigenvalues for the first three factors are greater than .7 which meets Joliffe's criterion for extraction of factors (Field, 2005, p.644). The next largest eigenvalue is below the .7 cut-off point. This matches the underlying theoretical model of three emotional dimensions. The combination of the numerical and theoretical elements justifies the extraction of three components in this case. Together these three explain 70.637% of the total variance. It is worth noting that although the three component model is justified in this case, a cut-off value of 1 is also often used for eigenvalues (Field, 2005). This would mean extraction of two components rather than three. Another criteria often used for determining the number of components to extract is a qualitative analysis of the added value in terms of percentage of variance explained through the addition of each additional component. Again, this suggests that the amount of added value drops quite a lot from two to three factors but does not decline substantially thereafter. This also suggests that a two-dimensional model would be justifiable. In other words, this analysis of the data appears to support either a two- or three-dimensional model for emotional geographies of learning. As Jenkins and Oatley suggest that there is a theoretical reason for seeing the three-dimensional model as more generalisable

Table 2 Initial extraction, eigenvalues, and total variance explained from principal component analysis

Component	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.251	55.010	55.010	8.251	55.010	55.010
2	1.520	10.136	65.146	1.520	10.136	65.146
3	.824	5.492	70.637	.824	5.492	70.637
4	.602	4.014	74.652			
5	.542	3.614	78.266			
6	.479	3.196	81.462			
7	.453	3.020	84.482			
8	.394	2.628	87.109			
9	.381	2.540	89.650			
10	.331	2.207	91.857			
11	.277	1.848	93.704			
12	.257	1.716	95.420			
13	.244	1.626	97.046			
14	.230	1.535	98.581			
15	.213	1.419	100.000			

(that is, applicable in a wider set of cultural contexts), we will continue to explore the three-component solution here; however, this issue is discussed below.

Table 3 presents the rotated component matrix for the extracted factors. Jenkins and Oatley note that in Western cultures, at least two of the components (affiliation/warmth and attachment/safety) may well be correlated with each other. Therefore, it made sense to use an oblique rotation. By and large, the items load onto the expected factor. Friendly, Warm, Caring, Positive towards students, and Compassionate load most strongly onto component 1 (Affiliation/warmth) while Impressive, Admirable, Influential, Exciting and Inspiring load onto

Table 3 Rotated pattern matrix for three component solution

	Component		
	Affiliation/warmth	Assertion/status	Attachment/safety
Warm	**0.901**	0.162	0.178
Friendly	**0.877**	0.082	0.100
Caring	**0.698**	0.059	− 0.153
Compassionate	**0.638**	− 0.113	− 0.331
Positive towards students	**0.584**	0.074	− 0.307
Reassuring	**0.479**	0.065	− 0.393
Impressive	− 0.107	**0.927**	0.104
Exciting	0.196	**0.731**	− 0.035
Influential	0.000	**0.679**	− 0.200
Inspiring	0.199	**0.646**	− 0.179
Admirable	0.259	**0.644**	− 0.012
Reliable	− 0.160	0.305	− **0.776**
Trustworthy	0.104	0.131	− **0.718**
Well intentioned	0.396	− 0.112	− **0.582**
Inspires confidence	0.348	0.158	− **0.517**

Notes: Extraction method is principal component analysis. The rotation method is Oblimin with Kaiser normalisation. The rotation converged in 21 iterations. Items in bold are those which load strongly and are retained for each factor, as described in the text

component 2 (Assertion/status). Trustworthy, Inspires confidence, Reliable and Well-intentioned load most strongly on component 3 (Attachment/Safety). The item Reassuring was expected to load most strongly onto Attachment/Safety, however, in our data is loaded most strongly onto Affiliation/warmth.

Reliability for these scales is high: Cronbach's alpha is .903 for the six-item Affiliation/Warmth scale, .881 for the five-item Assertion/Status scale and .860 for the four-item Attachment/Safety scale. All of these are well above the .7 threshold typically used to designate sufficient reliability in a scale of this type.

A final question worth considering at this time is whether or not the scales in question actually predict some aspect of the quality of student experience. To this end, a multiple regression was done to analyse whether the three-dimensional model contributed to our understanding of the factors which influence student evaluations of teaching. The suitability of the data for multiple regression was verified: the tolerance/variance inflation factor (VIF) multicollinearity diagnostic are all within acceptable ranges (tolerance diagnostic for example, range from .81 to .67; Durbin-Watson statistic = 1.823; observation of the regression standardised residuals plot also indicates the data's suitability for multiple regression).

The regression analysis itself (Table 4) shows that the student ratings of the emotional relationships of learning are a very good predictor of their evaluations of courses. In total, the three dimensions explain a remarkably high 59.7% of the variance in the student evaluations of courses (i.e. the sum of the change in R^2 at each step is .597) suggesting the three dimensions of emotional geographies are a very good predictor of student ratings of teaching. Each dimension adds significantly to the model, with the assertion/status dimension contributing most.

Discussion

The question at the heart of this paper is how the emotional quality of student-teacher relationships as perceived by students should be theorised and measured.

Firstly, it was suggested that these relationships should perhaps be framed in terms of their emotional quality rather than in terms of teacher behaviour itself. Framing the relationships in terms of emotions is more in keeping with the way research on relationship has developed in the last two decades and is likely to be less culturally and contextually

Table 4 Multiple regression of three component dimensions on student evaluation of teaching

	B	SE B	Beta
Step 1			
Constant	5.22	.042	
Assertion/status	1.06	.042	.657*
Step 2			
Constant	5.21	.037	
Assertion/status	.79	.041	.49*
Attachment/safety	.63	.042	.39*
Step 3			
Constant	5.21	.035	
Assertion/status	.69	.041	.429*
Attachment/safety	.44	.044	.271*
Affiliation/warmth	.42	0.43	.262*

Note: R^2 = .43 for step 1, R^2 change = .12 for step 2 and = .05 for step 3. *indicates $p < .001$.

specific than using descriptions of behaviour. The data here suggests that it is appropriate to conceptualise student-teacher relationships in terms of student perceptions of their emotional quality: the low rate of missing data, for example, suggests that students did not have difficulty with rating the extent to which they associate a course's professor with terms like compassionate, impressive, or trustworthy. This was despite the fact that most students were in large classes (over 200 students) and despite the fact that they were studying in disciplines which are typically not strongly associated with emotion (natural sciences and engineering).

Secondly, it was suggested that rather than thinking of teacher-student relationships only in terms of valence, we should think of them in a multidimensional space. Two-dimensional (e.g. Fiske et al., 2007) or three-dimensional (Oatley et al., 2006) models were both suggested in the literature. The results of the principal component analysis supports either a two- or three-dimensional model. The two-component model essentially collapses the Affiliation/Warmth and Attachment/Safety dimensions onto each other with Assertion/Status remaining as an independent dimension. This is a justifiable interpretation of the data. However, Jenkins and Oatley note that while such a two-dimensional model fits with occidental cultures, it may be less applicable outside western cultural contexts. While the three-component model is favoured here, the two-dimensional model is also a good fit for the data (which is actually what one might expect given that the study took place in an occidental cultural setting). In fact, both the two- and three-dimensional models will satisfy the requirements of measurability and multi-dimensionality.

It was noted at the outset that teacher-student relationship has been found to be important in terms of some dimensions of learning, student learning behaviours, student incivility, student attendance and dropout, and overall student experience. The data reported here confirms that student's emotional responses are a good predictor of students' perceptions of the quality of their experience. Indeed, the three scales together explain almost 60% of the variance in the student course rating. This suggests that if we are interested in improving the students' perceptions of the quality of their experience, we will pay attention to the development of warmth, trust, and admiration in classes.

Implications for higher education teachers

The data presented here reconfirms what Quinlan (2016) and others have been saying: the emotional relationships in classes are an important dimension of the higher education experience. Care work in universities is often challenging for faculty members (Walker et al., 2006) but the evidence here suggests that the emotional quality of relationships explains a large part of student satisfaction with courses. Quinlan includes a number of recommendations for higher education teachers to improve relationships including learning names, seeking student feedback during term, being clear and consistent, being enthusiastic, and being accessible to students outside class (2016, p. 105).

Thinking about relationships in a multidimensional way is also useful for teachers. Personality differences mean that not every faculty member feels as if they can be warm or friendly towards students. The multidimensional model suggests that these teachers should perhaps focus their attention on eliciting trust (the safety dimension), and on eliciting admiration (the status dimension). Indeed, for those who dismiss student evaluations of courses as being nothing more than a "beauty contest" or a "likability test", it is notable that most of the explained variance in student evaluation of courses came from the status and safety

dimensions. As such it may be that warmth has been somewhat overemphasised in the literature thus far.

The multidimensional nature of relationships also suggests that some of the folk wisdom about teaching in universities is likely to be wrong. It is not unusual to hear novice teachers being told by other teachers that they should not smile too much for the first few weeks in order to make sure students respect them. This idea focuses solely on the immediacy of the relationship and proceeds from the hypothesises that "positive" relationships are not conducive to respect: the evidence presented here suggests that these two dimensions (perceptions of warmth and perceptions of competence) should be regarded as two different things. Smiling and seeming competent are, it seems, reasonably independent: it is possible to do either, both, or neither.

Implications for university administration

It was noted at the outset that measures of student-teacher relationship need to be understood in the wider context of an analysis of the social and cultural organisation of university life. Viewed from this perspective, while it makes sense for individual teachers to think of approaching student-teacher relationships with a view to "maximising" the student's sense of the teacher's warmth, trust and intellectual competence, it may well be a mistake for universities to approach this question in the same way. This is not to suggest that we should ignore the students' perception of the student-teacher relationship: it has, for example, been argued (e.g. Dalton & Crosby, 2013) that students are treated like second-class citizens in universities and that central to improving their position in our communities is to instil an ethic of care. At the same time, the relationship between the multidimensional approach to relationships and intergroup stereotypes (Cuddy et al., 2007) and implicit biases (Nosek et al., 2002) should draw our attention to the way ethnicity and gender can help to shape students' emotional responses to teachers. Recognising the potential for there to be discriminatory patterns in students' perceptions of relationships does require the ability to step back from the rich detail of qualitative descriptions of interaction to be able to see how patterns play out across larger groups of people. This can be achieved through the use of quantitative tools like CARI, which can allow us to see social patterns and inequalities that might not otherwise be seen. However, quantitative tools also carry a risk if institutions simply seek to "maximise" the student's feeling of the teacher's warmth, trust, and intellectual competence without taking into account the way in which such feelings are mediated by social categories such as gender or ethnicity. This would be a major error.

This issue is all the more crucial, given that the role of emotions in higher education is already a space in which power dynamics are clearly evident. It has already been identified that "care" can be readily gendered in academia, that many women academics experience different patterns of socialisation and progression compared to male colleagues and that the allocation of roles and duties means that they typically end up devoting more time to "service" and "care" work than do men (see Acker & Feuerverger, 1996; Ducharme & Ducharme, 1996; Murray, 2006). Where this "care" work is assigned a low status it becomes an exploitative form of emotional labour. Mariskind, (2014, p.318) has argued that, "care" has often been narrowly associated with warmth and with supporting student well-being through care-giving, and this has been part of a broader process of gendering and individualising responsibility for care which in turn entails professional costs when that care work is not acknowledged or supported by institutions. Mariskind argues that in order for care work to be adequately valued, care in

higher education needs to be re-imagined outside of this narrow view to include "qualities traditionally seen as masculine and feminine", including both a focus on student well-being as a precursor to academic success, but also on academic success as a precursor to well-being: "staff, and students would benefit from an understanding of care as a life-sustaining web of relations …throughout higher education institutions that support individual and collective well-being and enhance teaching and learning". In de-centering the "warmth" dimension of relationships and drawing attention to feelings of trust and admiration, the multi-dimensional model can contribute to this re-thinking of relationships in ways which are less tied to exploitative discourses. This is not to suggest warmth should be seen as unimportant—rather that warmth, trust, and admiration are seen together as elements of a re-imagined and less exploitative conceptualisation of care work.

Implications for student-teacher relationships research

Quinlan has recently noted that while there is a growing awareness of the importance of emotional relationships in teaching in higher education, there is not yet a clear theory of emotional relationships that might help move the conversation from personal preferences and opinions to a solid grounding in theory or evidence (Quinlan, 2016, p. 105). The multidimensional model of affective student-teacher relationship provides a theoretical basis on which these relationships can be conceptualised, and the CARI provides a tool for collecting evidence that can deepen our understanding of the role of student perceptions of the emotional quality of relationships in teacher and student experience. The three-dimensional model of student-teacher relationships can help both quantitative and qualitative researchers see more and understand better by broadening the focus of the discussion to include all three emotional dimensions of social relationships. A better understanding of how warmth, safety, and awe are differentiated and linked can enable researchers to develop a richer understanding of what is at play in classroom relationships. It should also ensure that notions of power and status are intrinsically linked to discussions of care. CARI has been developed in order to be suitable for use in a range of different cultural contexts, and to reflect important dimensions of social life—including power relations, warmth, and trust. It should, therefore, be a valuable tool for researchers who wish to explore how cultural and social factors influence student-teacher emotional relationships.

It is perhaps also worth thinking about how CARI could be used to shed new light on the work of academics. It could be used, for example, to explore whether there is evidence of systematic bias in students' emotional responses to faculty based upon their gender or ethnicity (something which was not possible in this study since teachers were not identifiable). It could be applied in a range of cultural setting to see if, for example, warmth or status were regarded as more or less important to students in different settings. Perhaps it could also be redeveloped to explore the ways in which faculty see their relationships with university leadership—an Academic Affective Relationship Inventory. Indeed, such a tool may well shed interesting light on warmth, trust, and perceived competence in higher education.

Limitations

As with any study, it is important to note that this study has a number of limitations. This research took place in one institution in one cultural context. One peculiarity of this

context is the comparatively low percentage of female teachers and students. The use of the instrument in more settings—including more gender-balanced settings—will certainly enhance our understanding of the multidimensional nature of student-teacher relationships in higher education. Most of the students who participated in this study were first-year students; all were studying natural sciences or engineering, and many were in large classes. The strict anonymity requirement also meant that relatively little data was collected about the students and teachers. It would be interesting to know in the future if year of study, class size, discipline, or student or teacher background impacts on the students' perceptions of the emotional quality of relationships in teaching.

In this study classes were selected to ensure a gender balance in student respondents and so respondents were not selected randomly. This limits the ability to draw inferences from the data (even if it should not actually make any difference to the exploration of the multidimensional nature of emotional relationships). Since the goal was to have a wide variety of classes represented in the study while at the same time respecting the need to retain the anonymity of the teachers at the point of data collection, the design did not allow for the collection of much data about the teachers or courses in question. Nor did it allow for courses or teachers to be randomly sampled, or for the collection of meaningful learning data and so it is not possible in this study to assess if the different dimensions of emotional relationships are associated with learning.

Conclusion

The literature on emotional dimensions of student-teacher relationship in higher education makes clear that such relationships can play a significant role in both student and teacher experience. Existing attempts to make sense of these relationships generally characterised them in behavioural terms and in terms of closeness (immediacy) or distance. The emotional revolution in psychology and sociology over the last few decades has also reached studies of higher education and the role of emotions in characterising these relationships has become clearer. So too has their multidimensional nature. The emotional quality of relationships between students and teachers in higher education is probably best characterised in three dimensions: teachers and student can feel warmth towards each other, they can feel trust for each other, and they can feel admiration—perhaps even awe—for each other's competence. These three dimensions are likely to be related but can also be seen and measured as separate; a teacher who may not communicate warmth and friendliness to students can still communicate that they are consistent and worthy of admiration. On the other hand, students may well feel some degree of fear with respect to a teacher who is perceived to be unreliable or inconsistent even if that teacher is also friendly and approachable. This three -dimensional model allows for greater clarity and nuance in how teachers, university administrators, and researchers think about the kinds of relationships we want students and teachers to have.

Hargreaves' (2001) work on emotional relationships proved an inspiring concept and metaphor for educational researchers—that of "emotional geographies". The multidimensional approach to affective relationships extends this notion of "emotional space" into three-dimensions. The Classroom Affective Relationships Inventory provides a compass

to help further explore and describe the landscape of higher education's emotional geographies.

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