



Course characteristics influencing students' oral participation in higher education

Elisabeth Mundt¹ · Martin Hänze¹

Accepted: 28 October 2022 / Published online: 21 November 2022
© The Author(s) 2022

Abstract

Many teachers strive for lively student participation in class. This field study examined aspects of learning environments in higher education with regard to their connection with students' oral engagement. Overall, six factors that might increase or decrease oral participation were investigated: the number of teacher questions, course atmosphere, level of demand, student preparation (e.g., through homework), class size, and subject discipline. The sample consisted of 80 courses of diverse disciplines at a public university in Germany; variables were measured by trained observers as well as by the attending students. Student oral participation was indicated by the number of student questions, the number of student contributions, and an engagement rate denoting the breadth of participation in a course. Three multiple regression analyses revealed a differentiated pattern of results: Whereas the number of student questions increased with the level of demand and a positive course atmosphere, the number of contributions and the breadth of participation were both closely linked to the number of teacher questions posed, but were also influenced by student preparation, level of demand, and the teaching culture of the subject discipline. Class size did not have a significant effect on any of the three participation measures. With respect to empirical research on student participation, the study shows the necessity for a differential approach and the consideration of teachers' interactive behaviour. Regarding the design of learning environments and the manner of teaching, three implications for practitioners are to ask questions, to be friendly, and to assign homework.

Keywords Higher education · Learning environment · Oral participation · Student contributions · Student questions · Teaching behaviour

✉ Elisabeth Mundt
e.mundt@uni-kassel.de

Martin Hänze
haenze@uni-kassel.de

¹ Department of Psychology, University of Kassel, Holländische Str. 36-38, 34109 Kassel, Germany

Introduction

In higher education, students' oral participation in class is something that many teachers strive for. Some courses use discussions as a teaching method, and thus rely on students' contributions to cover the content, move forward, gather arguments, or examine a topic from different angles. Even in courses that are largely defined by teacher talks, student questions and contributions are usually welcome, as they show students' cognitive involvement and provide valuable feedback concerning student comprehension to the teacher. Apart from these didactic advantages, students' oral participation has been found to be positively related to critical thinking (Smith, 1977), other learning activities (Frymier & Houser, 2016), and achievement (Zumbrunn et al., 2014). Plus, students generally appreciate other students asking and answering questions in class, finding it helpful for their own learning (Nadile et al., 2021).

However, even though students' active engagement may generally be desirable, oral participation rates in university courses often remain low (Foster et al., 2009; Fritschner, 2000; Howard & Baird, 2000; Karabenick & Sharma, 1994; Nadile et al., 2021; West & Pearson, 1994). When West and Pearson (1994) examined teacher–student interactional sequences in college classrooms of various subjects, which all contained phases of lecture and discussion, they found an average of merely 3.6 student questions per class, with over 25% of them focusing only on classroom procedures such as the course syllabus, tests, and course assignments. In courses of various disciplines and levels, Fritschner (2000) further observed that only an average of 28% of the attending students participated verbally in class, with 18% of the students accounting for 79% of all the interactions. Thus, the great majority of the attending students did not participate at all. Nadile et al. (2021) compellingly confirm this phenomenon for large-enrolment science courses. Almost 50% of the students report that they never ask or answer a question, another 38% estimating that they ask or answer one or two questions in class per semester. Even when credited for it, as investigated by Foster et al. (2009), a considerable number of students does not participate in class discussions.

To be sure, a student's engagement in class is firstly determined by him- or herself, his or her individual interests, needs, and other personality characteristics (Fassinger, 1995; Nadile et al., 2021; Weaver & Qi, 2005; Yaylaci & Beauvais, 2017). But the particular learning environment of a course—its level of demand, the opportunity given to speak, the respective teacher's demeanour—may also either encourage or discourage students' participation. Seeing that university teachers can do little about demographics and the personality traits of their students, this study attempted to shed some light on the learning environment teachers can affect in order to enhance their students' willingness to participate.

Oral participation as an element of student engagement

For the purpose of clarification, we precede our further elaborations with a short overview of the different notions circulating in the literature on student involvement in education and localise oral participation within the broader frame of student engagement. The concept of student engagement overlaps with the terms of involvement and integration. It can apply to all levels of education and usually refers to the student experience as a whole, often with regard to retention and institutional quality (Wolf-Wendel et al., 2009). Reviewing the literature on engagement in educational contexts, Alrashidi et al. (2016) illustrate the considerable variation in terms, definition, and coverage. This proliferation of concepts and

the respective diversity of research led Azevedo (2015, p. 84) to state: “Engagement is one of the most widely misused and overgeneralized constructs found in educational, learning, instructional, and psychological sciences. (...) The term stands to lose its meaning, precision, and scientific utility because there is little agreement on a concrete definition.”

A particularly influential model of student engagement was presented by Fredricks, Blumenfeld, and Paris in 2004. It divides student engagement into the three components of behavioural, cognitive, and emotional engagement. Behavioural engagement, in turn, comprises three facets: positive conduct, involvement in learning and academic tasks, which includes oral participation in class, and participation in school-related activities. Similarly, Carini et al. (2006) divide student engagement into ten components, with oral participation being but one aspect of active and collaborative learning. Whereas a lot of research on student engagement encompasses both institutional and classroom levels, a number of studies pertain to classroom engagement only (e.g., Büchele, 2021; Handelsman et al., 2005; Rissanen, 2018). But even here, engagement is still conceptualised very broadly. In the study of Handelsman and colleagues (2005), for example, asking questions and raising hands are just two items in one of four engagement factors. Thus, most of the literature on student engagement is hardly informative for the issue of oral participation in class.

The term participation mostly refers to oral contributions in class (e.g., Burchfield & Sappington, 1999; Foster et al., 2009; Kim et al., 2020; Nadile et al., 2021). Chi and Wylie (2014) classify oral participation, and question asking in particular, as an exemplary activity in higher ranking modes of behavioural engagement. However, it needs to be noted that the perception of oral participation in class as being desirable and an indicator of students’ involvement certainly is culture specific, particularly common in Western education. Students’ mindset and behaviour regarding their oral contributions in class vary between culturally distinct countries (e.g., Cheng et al., 2011; Frambach et al., 2014).

Whereas an extensive body of literature deals with student engagement in higher education, only a fraction is concerned with oral participation in class. Our study contributes to this line of research by solely focussing on the aspect of oral participation (regardless of varied wording). Specifically, we aim at interaction in whole-class situations, not in small-group settings. Regarding this specific kind of active involvement, we wanted to expand the knowledge on the relevance of different aspects of learning environments.

Empirical evidence on factors influencing oral participation in higher education

Within the research on classroom interaction in higher education, the identification of student and course characteristics that influence oral participation has always been an issue. Student participation varies greatly between the individual students attending a course (Crombie et al., 2003; Fritschner, 2000). The primary reasons given by students for not participating were identified by Howard and Baird (2000, p. 712) as “the feeling that I don’t know enough” and “the chance I would appear unintelligent to other students”. Similarly, Nadile et al. (2021) report anxiety when speaking out and fear of negative evaluation by others as the major reasons for not asking or answering questions in class. Correspondingly, Rocca (2010) listed students’ confidence and communication apprehension as two of the individual characteristics that most determine oral participation. Frymier and Houser (2016) also found a correlation between students’ communication apprehension and the frequency of their oral participation, and Fassinger (1995) presented evidence for the relevance of student confidence, interest, and gender. Weaver and Qi (2005) also consider student preparation and confidence as two of the most decisive psychological student

characteristics for oral participation. However, they perceive these personal characteristics as mediators, which are influenced by the learning environment. Thus, students' individual readiness for participation is thought to be dependent on classroom characteristics (Rocca, 2008; Weaver & Qi, 2005).

Fassinger (1995) conducted a comprehensive study of a multitude of possible determinants of student oral participation in higher education classrooms. Overall, she included 29 variables pertaining to the class (e.g., class size, gender distribution, participation grade), the teacher (e.g., professors' approachability, feedback style, expertness), and the students themselves (e.g., confidence, preparation, interest). As one of her major findings, she concluded that it was not the university teachers' personality, sex, or level of expertise that affected student participation; instead, teachers influenced student engagement through their way of teaching, i.e., the design of their courses, the teaching methods that they chose, the atmosphere that they created, and so on.

Focussing on aspects of the learning environment that influence student participation, we can see four major topics evolving from the literature. Firstly, *class size* is listed by Rocca (2010), Fassinger (1995), and Weaver and Qi (2005) as one of the main determinants of students' oral participation. There are several ways in which this feature may affect students' verbal engagement: Large classes permit the withdrawal of the majority of students when it comes to active participation; plus, "the sheer number of students in larger classes might elevate students' fears associated with participation—i.e., criticism from faculty and disapproval of peers (...)—and so indirectly diminish participation" (Weaver & Qi, 2005, p. 573). In small classes, students tend to be less anxious and can less easily hide. This notion is supported by the comments Micari and Calkins (2019) received when asking students about the factors that discouraged them from posing questions in class: Several students mentioned a large class size to be intimidating or discouraging to them. Apart from these affective consequences, class size is also closely linked with the teaching approach used in a course. The number of students attending largely determines the choice of teaching methods, which come with disparate levels of participation opportunity.

The second aspect considered here is, therefore, the teaching methods used or, to be more concise, *teachers' interactive behaviour*. Naturally, kind and quantity of student participation depend on the way the teaching is conducted in a course (e.g., Greeson, 1988; Rissanen, 2018). Lecture based teaching, for example, limits opportunities for students to participate, whereas discursive formats downright force students to chip in. Observing particularly low participation in introductory courses, Fritschner (2000) suspected the way of teaching found here to be the primary reason. These courses were usually high-paced lectures, which did not necessarily schedule student participation. Upper-level courses, on the other hand, more often contained discursive phases which encourage students much more to contribute during class. A key marker of these varying teaching approaches and the level of interactivity promoted by the teacher is the number of questions that teachers pose to elicit student contributions. Teacher questions have been the focal interest of a lot of research in educational settings (e.g., on the coherence between the cognitive level of teacher questions and the respective student answers; Dillon, 1982; Mills et al., 1980). However, even though they are possibly the most straightforward predictor of student participation, this element of university teachers' interactive behaviour is scarce in empirical studies trying to explain student participation in higher education.

The third major issue that is broadly discussed as a precondition for students' active participation is *course atmosphere* (Fassinger, 1995; Karabenick & Sharma, 1994; Micari & Calkins, 2019; Rocca, 2008, 2010; Weaver & Qi, 2005). Weaver and Qi (2005) elaborated on the risks that come with perceiving faculty as an authority of knowledge and the

classroom's given hierarchical power structure, which might both constrain participation. As one way to counteract this difficulty, they propose creating an atmosphere of openness, respect, and equality. Rocca (2008) investigated classroom participation among undergraduate students and found small but significant correlations with nonverbal immediacy (positive) and verbal aggressiveness (negative). In Fassinger's (1995) study, one of the four course variables that emerged as significant predictors of student participation in the multiple regression analysis was emotional climate. Micari and Calkins (2019) and Karabenick and Sharma (1994) specifically investigated the connection between students' question asking behaviour and course atmosphere, but found ambiguous results. Micari and Calkins (2019) asked undergraduates in different introductory lecture-style university courses about their instructor's openness to student questions, their own help-seeking behaviour, and their final grade. They report a small positive effect of perceived instructor openness on student grades, which is partially mediated by students' help-seeking behaviour. Disrespectful demeanour of the teacher was further explicitly mentioned by the students when openly asked about factors that discourage them from posing questions in class. In contrast, the findings of Karabenick and Sharma (1994) suggest that the low number of student questions asked in college classrooms might not be explained by low levels of perceived teacher support. While perceived support did lead to less inhibition, students also tended to have fewer questions when having a positive impression of the teacher; thus, the number of student questions did not increase with better teacher support. Gasiewski et al. (2012) and Zumbrunn et al. (2014) both investigated student engagement using a very broad understanding of the concept, with oral participation in class being only one aspect of it. Gasiewski and colleagues (2012) found that students tend to be more engaged in courses in which instructors signal an openness to student questions and consider it their primary task to help students learn; Zumbrunn et al. (2014), in contrast, reported that a supportive classroom environment was directly linked to neither personal engagement nor achievement. These contradictory findings suggest that a positive classroom atmosphere has at best small and possibly differential effects on students' oral participation.

A fourth factor mentioned in the literature on oral participation in class is *student preparation*. Homework assignments that lead to better preparation are proposed as one means to increase confidence and reduce apprehension (Rocca, 2010). Elaborating on the significance of preparation, Weaver and Qi (2005) pointed out how the lack of preparation can exacerbate fears of disapproval by peers or faculty criticism and, hence, diminish students' readiness to risk participation. When feeling well prepared, on the other hand, students are more confident about their understanding of the material and, thus, might participate more readily. However, empirical support for the effectiveness of homework on course level is still scarce.

Participation motivation as the theoretical link to student participation

In the literature, there is repeatedly mention of mediations and indirect effect paths from teacher and learning environment to student participation (e.g., Fassinger, 1995; Rocca, 2008, 2010). As oral participation usually is an act that students can freely decide to perform or not, we conceive the motivation to participate as a necessary precondition for their actual involvement. A basic but encompassing model explaining human actions is expectancy-value theory (Eccles et al., 1983; Wigfield & Cambria, 2010). It states that people probably will undertake a task if 1) they think themselves capable of doing it (expectancy

of success) and 2) if they appreciate the task activity or its consequences (value). Eccles et al. (1983) advanced the model and proposed four distinct components of task value: attainment value, intrinsic value, and utility value add to motivation, whereas the cost of doing a task (e.g., effort, loss of time, or emotional strain in the case of failure) can diminish its value.

Applying the model to the context of higher education and the issue of oral participation, students assign both a certain value and a certain expectancy to a verbal contribution that they could make. And it is these motivational components that determine their intention to speak out. For instance, the importance of a question for clarifying complicated subject matter or the potential gain in the professor's regard by means of a smart remark both define the utility of participatory acts and thus their value. Similarly, many students mention the risk of appearing unintelligent to other students or to the instructor as a primary obstacle for oral participation (Howard & Baird, 2000; Nadile et al., 2021). This concern clearly refers to potential social costs. Students' fears of disapproval affect their willingness to risk participation and make them adhere to the prevailing custom of remaining silent in class. Weaver and Qi (2005) point out that next to the shame due to wrong or odd contributions and possibly public humiliation through faculty criticism, there is another risk that students might take into account before speaking: by not adhering to the norm of passivity, they might be viewed as being different or even a nerd or 'sucker' by the other students.

Presumably, the previously mentioned factors that are related to oral participation in higher education also take effect by increasing students' motivation to engage. Student preparation, for instance generated by homework tasks, can affect students' expectancy of success. A positive climate can alleviate the fear of failing in a verbal contribution. Moreover, class size might very well affect the cost/benefit calculation of oral participation as suggested by Weaver and Qi (2005); at the same time, small student numbers might make interactions more enjoyable and thus increase the intrinsic value of participation.

A further aspect, which is central in research on achievement motivation theory, is the difficulty of the task ahead (Atkinson, 1957). With regard to participation in higher education, this would refer to the challenge of formulating a valuable contribution or a bright question. This difficulty might be linked to the level of demand encountered in a course. A high level of demand could dampen students' confidence to say something smart, but possibly increase the urgency and thus the utility value of questions. Thus, investigating the level of demand as another course factor that might impede or enhance student participation seems promising.

When pondering over the diverse teaching aspects that might foster students' willingness to get engaged, the necessity of a differentiated view becomes apparent. The acts of posing questions on one side and replying to teacher queries on the other follow quite disparate logics and, therefore, will be affected differently by the various teaching aspects. Flammer (1981) described missing and contradictory knowledge as well as insecurity about ones' own understanding as primary reasons for posing information questions. These perceived deficits stand in stark contrast to high ability beliefs that otherwise could be a requirement for answering teacher questions or offering opinions and statements in a debate. Thus, the number of student questions might increase with the difficulty of the content covered, whereas the number of other student contributions probably would not. Similarly, student participation in course discussions could grow if students have to prepare for the course—with obligatory reading tasks or the like; this didactic measure is unlikely to affect the number of questions posed though. Thus,



Fig. 1 Theoretical model

any analyses of the relation between teacher or course features and student engagement would need to differentiate between the distinct kinds of oral participation. Figure 1 summarizes the core constructs that are taken up by this study and illustrates the presumed theoretical linkage between aspects of the learning environment and student participation.

Research question and study design

Seeing the need for informative research on student participation in higher education and the sketchy empirical evidence available on the matter, we devised a study to answer the following questions: *Which course characteristics influence students' oral participation in class? And do different kinds of oral participation respond to different course characteristics?*

Building on prior empirical work and expectancy-value theory as our theoretical framework, we hypothesised that a positive atmosphere would reduce the cost of speaking up (e.g., embarrassment) and thus generally fuel oral participation. The preparation for a course might specifically lead to higher numbers of student contributions, as it boosts students' expectancy of success; however, it should not affect students' questioning behaviour. In contrast, students might be more prone to ask questions if the value of asking was augmented by a high level of demand, whereas the number of student contributions might decline. Class size might affect the cost associated with oral participation, thus resulting in higher engagement levels in smaller classes. However, as many studies that reported links between student participation and class size did not control for corresponding aspects such as the teaching methods used, we are uncertain about its specific contribution to oral participation. Teachers' interactive behaviour, lastly, is expected to be directly associated with oral participation, as it creates opportunity and explicitly calls for students' contributions.

To warrant the validity of our study, the following issues seemed essential: First, to acknowledge the different mechanisms that apply to student questions and student comments, these different kinds of student participation needed to be investigated independently. In addition to this distinction between types of students' verbal contributions, we decided to consider yet another aspect of student participation: the breadth of oral participation, i.e., the number of students who are engaged in classroom discourse. As broad participation is a goal for which many teachers strive, it seemed interesting to find out which course aspects would be favourable for broad student involvement. Naturally, the relative breadth of participation would be wider in smaller courses. But, apart from class size, empirical studies of engagement in high school hint that the question asking behaviour of the teacher could be an effective tool to broaden participation as well (Kelly, 2007). In any

case, the separate inspection of these distinct markers of oral participation would allow for differential conclusions.

Second, to attain realistic estimations of the effects of the course characteristics, we needed to consider all of them simultaneously in one analysis—most importantly teachers' interactive behaviour. Naturally, students would very likely try to say something if questioned by the teacher; consequently, teacher questions could very well be the primary determinant of the number of students' oral contributions. By taking teachers' interactive behaviour into account, the effects of, say, class size and teaching approach on student participation could be untangled.

Method

Setting and procedure

This study was conducted at a middle-sized public university in Germany. Like in other parts of the Western world, active student engagement in class is generally regarded as desirable as it is believed to improve both teaching and learning (Chi & Wylie, 2014; Foster et al., 2009; Frambach et al., 2014; Fritschner, 2000). However, studies of actual teaching practices in German higher education reveal a widespread prevalence of teacher-centred approaches with only few opportunities for students to interact during class (Büchle, 2021; Fischer & Hänze, 2019; Seidel & Hoppert, 2011).

The study was part of a research project on quality teaching in higher education with data being collected during three semesters between 2014 and 2015. Before each semester, the participating teachers selected a course to be researched in the study. During the semester, trained observers visited these courses unannounced three times and documented teaching aspects such as the verbal contributions of teachers and students on a standardised form. At the end of the semester, the students attending the selected courses voluntarily completed a questionnaire giving their opinion about the course as well as describing their own involvement retrospectively.

Sample

The sample consisted of 80 university courses—48 lecture courses and 32 seminar courses—stemming from undergraduate and graduate programmes of diverse disciplines. Thus, it comprised discussion courses in philosophy, linguistic seminars in Spanish, reading courses in sociology, large introductory lectures in economy, and small high-level lecture courses in physics, among other. Twenty courses could be subsumed in the subject category of natural sciences and mathematics, whereas 60 were situated in other disciplines. In Germany, most university courses have a duration of 90 min; in our sample, the average session length over all the courses was $M=91.4$ min ($SD=16.0$ min).

The courses were conducted by 79 different teachers, who took part voluntarily with the incentive of receiving feedback on some aspects of their teaching afterwards. Of these teachers, 61 were full professors, while the other 18 held research assistant or lecturer positions; 58 teachers were male and 21 were female. They all had a minimum of 3 years teaching experience, with the longest-serving employee reporting 37 years ($M=18.4$, $SD=8.2$).

Over all the courses, 2,590 students took part in the survey at the end of the semester. They were on average $M=23.2$ ($SD=4.3$) years old and had been studying for $M=4.2$ ($SD=2.6$) semesters; 58.7% of them were female.

Measurements

The data used in this study stem from trained observers as well as the students attending the selected courses. The observations were carried out each semester by two to three senior students, who had completed a training of about 24 h. The training aimed at increasing the reliability of the observational ratings and mainly consisted of assessments of eight video recordings and four live sessions of university courses with subsequent calibration talks with the first author. Thereafter, each course was visited three times unheralded by the observers—in the beginning, in the middle, and at the end of the semester. That way, a minimum reliability of the course values was to be ensured. To determine the interrater agreement between the observers, about 25% of all sessions were visited jointly. As an indicator for their accordance, the single measure intraclass correlation coefficient ($ICC_{1,1}$) is given for the observed variables, one value per semester. The ratings of the three observed sessions were aggregated to obtain a single value for each course, ratings of joint visits being included as an average. Similarly, the student-reported variables were aggregated course-wise to obtain one value per course.

Criteria

To properly assess the three aspects of student participation, we decided on two measurement features beforehand. Because students' self-report of own classroom participation might be biased by social desirability or false memory (Azevedo, 2015; Burchfield & Sappington, 1999), we decided to use expert observations to appraise student behaviour. Doing that, we regarded students' oral participation in each course as a whole and measured the total number of questions and contributions per session. This approach seemed reasonable as we were interested in the effect of course variables and the analyses were to be conducted on course level only.

Firstly, the number of content-related *student questions* (i.e., comprehension questions, not on organisational matters) asked during a session was counted by the observers with good agreement ($ICCs: .72, .76, .90$). Over all the courses, an average of $M=2.2$ ($SD=2.5$, $Min=0.0$, $Max=12.7$) questions were asked in one session.

Secondly, the number of other *student contributions* made by students during a session (e.g., answers, proposals, opinions, critical remarks) was counted by the observers with very good agreement as well ($ICCs: .99, .85, .99$). On average, $M=18.1$ ($SD=13.9$, $Min=0.0$, $Max=66.8$) contributions were made per session.

Thirdly, to indicate the *breadth of oral participation* in a course, we calculated an engagement rate, namely, the share of students that participated actively in a session. Both the number of students who participated orally and the total number of students present in that session were assessed by the observers. To avoid an unjustified disadvantage for large classes, we introduced a cut-off value: As it seemed hardly feasible and not realistic for more than 30 different students to participate orally during one class—the actual maximum number of distinct students participating in one session ranged at 24.2 ($M=8.6$, $SD=4.9$) in our sample—the total student number was truncated at 30 for this variable. The resulting

rate averaged at $M = 38.6\%$ ($SD = 21.6$, $Min = 3.3\%$, $Max = 89.8\%$); the interrater reliability for this variable was very good again (ICCs: .89, .88, .91).

Whereas the number of student questions was only loosely linked to the number of other student contributions ($r = .24$, $p < .05$) and the engagement rate ($r = .23$, $p < .05$) in the respective course, student contributions correlated highly with our measure of participation breadth ($r = .80$, $p < .001$).

Predictors

The most-important predictor of student participation, teachers' interactive behaviour, was operationalised as the number of content-related questions and tasks posed by the teacher. *Teacher questions* were counted by the observers with very good reliability (ICCs: .93, .91, .97). On average, participating teachers asked $M = 12.2$ questions per session, excluding questions on organisational matters. As was to be expected, the data revealed big differences in teachers' interactive behaviour between the various courses ($SD = 10.6$, $Min = 0.0$, $Max = 52.3$).

The variable of *course atmosphere* was also assessed by the observers and comprised three distinct aspects, each being measured on a 5-point Likert-scale: (1) rapport ("The teacher is respectful, friendly, and appreciative toward the students. He/She is attentive, open for other opinions and suggestions, takes student questions and comments seriously, and lets them finish"—1 *no, not at all*, 5 *yes, very much so*), (2) the working atmosphere in the course (1 *tense*, 5 *very relaxed*), and (3) the demeanour of the teacher (1 *aloof*, 5 *approachable*). The internal consistency of this measure was rather high (Cronbach's $\alpha = .80$). Over all the courses, course atmosphere was evaluated as $M = 3.5$ on average ($SD = 0.4$, $Min = 2.3$, $Max = 4.3$) with mostly satisfactory rater agreement (ICCs = .76, .47, .78).

The student-felt *level of demand* was indicated by the students at the end of the semester on a 3-item scale (e.g., "The teaching contents were difficult to understand", "The course was not particularly demanding" (inverted)) with good internal consistency (Cronbach's $\alpha = .71$). Answers were given on a 6-point Likert-scale with 1 indicating low and 6 indicating a high level of agreement. On average, students attested their courses a medium high level of demand ($M = 3.9$, $SD = 0.6$, $Min = 2.8$, $Max = 5.5$).

The level of *student preparation* in a course was indicated retrospectively by the students as well. They were asked about out-of-class work on the course content (homework) using a scale consisting of four items (e.g., "I did the tasks one was supposed to do in the context of this course", "I read all the required reading for this course"), which showed satisfactory internal consistency (Cronbach's $\alpha = .68$). The mean values for the courses averaged at $M = 3.5$, but varied considerably ($SD = 0.9$, $Min = 1.4$, $Max = 5.4$).

The organisational aspect of *class size* was operationalised as the number of students actually present during the semester. This variable was assessed by the observers with almost perfect interrater reliability (ICCs: 1, .99, .99). Over all the courses, an average of $M = 51.7$ students attended the sessions, but class sizes varied substantially within our sample ($SD = 58.5$, $Min = 9.0$, $Max = 346.7$).

Lastly, to account for effects that the subject discipline might have on students' oral participation in university courses, *subject discipline* was included as a control variable. Research has repeatedly shown that faculty in distinct scientific disciplines have disparate teaching approaches—attributable to their academic socialisation, the prevalent teaching formats, and the knowledge structure of the subject among other (Neumann et al., 2002;

Table 1 Bivariate correlations of predictors with predictors (upper part) and with criteria (lower part) ($N=80$)

	Teacher questions	Course atmosphere	Level of demand	Student preparation	Class size	Subject discipline
<i>Predictors</i>						
Teacher questions		-.23*	.16	.34**	-.14	-.30**
Course atmosphere			-.28*	.08	.18	-.19
Level of demand				-.05	.08	.40**
Student preparation					-.13	-.14
Class size						.08
<i>Criteria</i>						
Student questions	.20	.15	.38**	-.03	-.02	-.02
Student contributions	.81**	.06	-.04	.49**	-.18	-.45**
Breadth of participation	.66**	.11	-.04	.51**	-.21	-.43**

Subject discipline: 1 mathematics and natural sciences, 0 other

* $p < .05$; ** $p < .01$

Wilkesmann & Lauer, 2015). Accordingly, stimulation and occurrence of student engagement can differ between disciplines (Leach, 2016). Similar to the common distinction between hard and soft sciences, in our study, the various subject areas were divided into a dichotomous variable distinguishing between mathematics and natural sciences on the one hand and all other disciplines on the other (1 *mathematics and natural sciences*, 0 *other*).

Correlations between predictor and criterium variables are reported in Table 1.

Results

Three multiple regression analyses were computed to investigate the relevance of the predictor variables for the distinct aspects of oral participation. The results are summarised in Table 2. For the most part, the multiple regression coefficients reflect the bivariate relations (see Table 1); merely course atmosphere coheres with the three measures of student participation only when analysed together with the other predictor variables.

The pattern of results shows a clear divide between student questions on the one hand and student contributions and breadth of engagement on the other. The number of student questions was related to course atmosphere and level of demand. Student contributions and breadth of participation, in contrast, were both closely linked to the number of teacher questions; furthermore, they were predicted by atmosphere, student preparation, and the subject discipline, with courses in natural sciences and mathematics displaying lower levels of engagement. Class size did not have an effect on any of the three criteria.

Discussion

This study set out to investigate aspects of higher education teaching that influence oral participation in university courses. Importantly, a distinction was made between two different kinds of oral engagement, which are quite different in nature and might thus be dependent on divergent conditions: student questions and student contributions. As a further measure of interest, the breadth of participation was brought in as a criterion as well.

Table 2 Standardized regression coefficients of predictors on student questions, student contributions, and breadth of participation ($N=80$)

Predictors	Student questions	Student contributions	Breadth of participation
Teacher questions	.20	.75***	.53***
Course atmosphere	.33**	.19**	.20*
Level of demand	.47***	-.04	.03
Student preparation	-.12	.18**	.28**
Class size	-.10	-.08	-.13
Subject discipline	-.09	-.14*	-.20*
R^2	.27**	.78***	.62***

Subject discipline: 1 mathematics and natural sciences, 0 other

* $p < .05$; ** $p < .01$; *** $p < .001$

To account for the dialogic parts in higher education teaching, in which students speak up because they are directly prompted by the teacher, the number of questions that teachers posed was included as the most straightforward predictor of student participation. The study was conducted with a sample of 80 university courses in diverse departments, which ranged from introductory to advanced levels of higher education.

Summary and interpretation of results

Upon inspecting our data, first and foremost, the relations between the three criteria variables were noteworthy. Obviously, students' question asking manner was rather independent from their other engagement behaviour. The number of student contributions and the breadth of participation, on the other hand, were very closely linked to one another. Thus, in courses in which students participate a lot, it seems that many different students dare to join in the classroom talk.

Multiple regression analyses revealed a result pattern that largely matched our hypotheses and further underlined the importance of differentiating the distinct kinds of oral participation. Whereas the number of student questions increased with the level of demand, this course feature had no impact on the other indicators of student engagement. Instead, the number of student contributions and the share of students actively participating in a course were highly dependent on the amount of teacher questions and—to a lesser extent—the level of student preparation. Thus, we conclude that research on predictors of oral participation in higher education is meaningful only if student questions and contributions are examined separately.

With regard to the predictor variables included in our study, the findings are interesting in several ways. As predicted from the outset, there was a very close relationship between the number of teacher questions and student answers. Students are most likely to speak out if explicitly invited to do so. In the light of how much teacher questions alone contribute to explaining student participation, any study that strives to examine factors that influence oral participation needs to take the teachers' interactive behaviour into account in order to arrive at realistic estimations. Smaller class sizes, for example, might often come with higher student engagement (e.g., Fassinger, 1995), but the actual reason for that could lie in the more frequent use of interactive teaching methods in smaller courses.

As expected, we found a positive atmosphere to be conducive for both student questions and contributions—in number and in spread. In courses with a positive atmosphere, more questions were asked, more contributions were made, and a greater number of different students were involved in classroom talk. However, the fact that this relation was only apparent when simultaneously considering the other teaching aspects matches the variegated picture in the literature. A positive working atmosphere in university courses seems to be a helpful asset regarding student participation, but not one with great and clear-cut impact.

Interestingly, the level of demand only seems relevant for the number of questions asked in university courses. Hence, a low level of demand does not seem to be an effective way to increase participation. Possibly, student contributions might be encouraged most by a level of demand that students consider to be just appropriate, challenging but manageable. Too high and too low a level could both be counterproductive in terms of voluntary student contributions.

Our assumption regarding student preparation as a potential catalyst of student engagement seems to be confirmed by the results. A higher level of preparation coheres with higher numbers of student contributions and, in particular, a higher share of

students who participate actively. We assume that it is the higher level of confidence that boosts student participation. Surely, homework in higher education may often be combined with certain teaching methods that involve discursive elements (e.g., discussion seminars in philosophy or sociology that require preparatory reading). However, as the number of teacher questions was included in the analyses, we infer that student preparation really has an independent effect on student participation.

Contrary to what could be presumed based on earlier research, class size was not related to any of the three aspects of participation in our study. Thus, its effect seems to be negligible. In view of this finding, the often-mentioned concern of class size being an obstacle to student participation (Micari and Calkins, 2019; Weaver and Qi, 2005) can be relativized. Surprisingly, in our study, class size was also not related to any of the other predictors. Thus, we cannot substantiate our assumption that its effect on student participation, as reported in other studies, might be explained by the teaching methods used.

Lastly, the effect of subject discipline on student participation is noteworthy. The fact that the number of student contributions and the breadth of participation were systematically lower in natural science and mathematics courses points to the relevance of a subject-specific teaching culture. The cumulative knowledge structure with its objective facts found in the hard sciences coheres with a transmissive teaching approach, which might be reflected here (Neumann et al., 2002; Wilkesmann and Lauer, 2015). Possibly, the kinds of questions (closed vs. open) posed by the teachers in hard and soft sciences differ; accordingly, the number of student replies to one teacher prompt could vary. Crombie et al. (2003), for example, found varying levels of teachers' probing for elaboration in arts and social sciences vs. natural sciences courses, which led to distinct levels of student interactive behaviour, particularly different lengths of contributions. Also, students might hold disparate beliefs about their role as learners—either as people who mainly try to follow the explanations of the teacher and grasp the content (hard sciences), or as people who have an active part in the joint knowledge construction and hence engage in discussions (soft sciences). Exactly what part of the teaching culture in natural sciences and mathematics leads to students being less orally engaged in class remains an open question.

To sum it up, university teachers certainly influence the oral participation of students attending their courses by shaping the learning environment. They primarily trigger it by explicitly prompting students to engage. Apart from that, establishing a positive atmosphere in the course and having students prepare for class might also enhance the number and breadth of contributions. However, teachers do not need to worry about conditions such as class size or the level of demand of their teaching.

Limitations of the study

There are several aspects that limit the explanatory power of this study. Firstly, because of the correlational design, we cannot statistically show causal linkages but only infer the relations between the course variables and the measures of student participation as plausible interpretations.

Further, to actually examine the applicability of the expectancy-value model for the matter of oral engagement, a study with a mediation design—also assessing students' expectancy and the attributed value of oral participation—would be required. Within this study, it only served as a theoretical framework, which helped to find potential predictor variables and explained their effects.

Thirdly, we did not consider any characteristics of the students themselves. Clearly, this would have provided a fuller picture of the matter of student participation at university. With observer data pertaining to whole classes only, we were also unable to investigate differential effects of course characteristics (i.e., interactions between student and course variables). However, as we could not think of any plausible hypotheses for disorderly interactions, the exploration of main effects seemed sufficiently informative. Plus, we wanted to focus on effects of course characteristics, as they are the features that teachers can directly influence.

Final remarks and conclusion

With respect to both research and practice, the quantity of oral participation certainly is but one side of the coin. The quality of student questions and contributions is another interesting and important aspect that might help to explain and augment the potential of oral participation in the future. Here, an interesting perspective was put forward by Hard and RaoShah (2022), who propose to view and treat student participation as a matter of collaboration. Aside from considering the amount of oral participation, they differentiate between contributions which either build, question, or amplify the content.

Another aspect worth mentioning when talking about enhancing students' oral participation is that it is not a necessary prerequisite for learning. Despite the bulk of evidence showing a positive relationship between oral participation and achievement and conceptualisations that endorse active engagement (e.g., Chi & Wylie, 2014), it ultimately is students' cognitive involvement that matters in higher education (e.g., Fischer & Hänze, 2019). Correspondingly, Shi and Tan (2020) stress the notion of silent engagement as possibly equally conducive to learning. Aiming at higher levels of student attention and involvement during class without having to make them speak up, a growing body of literature suggests that the usage of student response systems might be an effective approach (e.g., Keough, 2012; Mayer et al., 2009).

But there are also specific methods, which stipulate students' oral participation in class. For ninth graders, Mundelsee and Jurkowski (2021) were able to show that collaborative practices like the Think-Pair-Share method could very well enhance student participation. By offering the opportunity to validate one's own thoughts and compare them to the ideas of a fellow student prior to speaking out in front of the whole class, this method reduces anxiety and enhances confidence. Consequently, students are more willing to share their ideas.

However, as this study shows, there are also starting points for increasing student participation that go without special didactic tools but rather involve the general course set-up. Wrapping up this study's findings, we want to derive some hints about how higher education teaching might be improved in that regard. So, what could instructors teaching under comparable circumstances learn from this study? Most importantly, that it is very well possible for university teachers to influence student oral participation in their courses. Three approaches that build upon the results of our study are:

1. Asking questions: If you want your students to participate actively in your classes, you might firstly consider involving them directly. Most likely, students will react to your prompts.

2. Being friendly: Students might engage more if you appear approachable, appreciative and open to their ideas, and if you create a good learning atmosphere. This could also lead to students more readily asking questions.
3. Including homework into the didactic scheme for your course and having your students do it (e.g., by making it a passing requirement or taking it up with fun exercises in class): The more competent students feel, the more likely they will participate in class.

Funding Open Access funding enabled and organized by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Alrashidi, O., Phan, H. P., & Ngu, B. H. (2016). Academic engagement: An overview of its definitions, dimensions, and major conceptualisations. *International Education Studies*, *9*(12), 41–52.
- Atkinson, J. W. (1957). Motivational determinants of risk-taking behaviour. *Psychological Review*, *64*(6), 359–372.
- Azevedo, R. (2015). Defining and measuring engagement and learning in science: Conceptual, theoretical, methodological, and analytical issues. *Educational Psychologist*, *50*(1), 84–94.
- Büchele, S. (2021). Evaluating the link between attendance and performance in higher education: The role of classroom engagement dimensions. *Assessment and Evaluation in Higher Education*, *46*(1), 132–150.
- Burchfield, C., & Sappington, J. (1999). Participation in classroom discussion. *Teaching of Psychology*, *26*(4), 290–291.
- Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education*, *47*(1), 1–32.
- Cheng, H., Andrade, H. L., & Yan, Z. (2011). A cross-cultural study of learning behaviours in the classroom: From a thinking style perspective. *Educational Psychology*, *31*(7), 825–841.
- Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, *49*(4), 219–243.
- Crombie, G., Pyke, S. W., Silverthorn, N., Jones, A., & Piccinin, S. (2003). Students' perceptions of their classroom participation and instructor as a function of gender and context. *The Journal of Higher Education*, *74*(1), 51–76.
- Dillon, J. T. (1982). Cognitive correspondence between question/statement and response. *American Educational Research Journal*, *19*(4), 540–551.
- Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Mece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75–146). W. H. Freeman.
- Fassinger, P. A. (1995). Understanding classroom interaction: Students' and professors' contributions to students' silence. *The Journal of Higher Education*, *66*(1), 82–96.
- Fischer, E., & Hänze, M. (2019). Back from “guide on the side” to “sage on the stage”? Effects of teacher-guided and student-activating teaching methods on student learning in higher education. *International Journal of Educational Research*, *95*, 26–35.
- Flammer, A. (1981). Towards a theory of question asking. *Psychological Research Psychologische Forschung*, *43*, 407–420.
- Foster, L. N., Krohn, K. R., McCleary, D. F., Aspiranti, K. B., Nalls, M. L., Quillivan, C. C., Taylor, C. M., & Williams, R. L. (2009). Increasing low-responding students' participation in class discussion. *Journal of Behavioral Education*, *18*(2), 173–188.

- Frambach, J. M., Driessen, E. W., Beh, P., & van der Vleuten, C. (2014). Quiet or questioning? Students' discussion behaviors in student-centered education across cultures. *Studies in Higher Education, 39*(6), 1001–1021.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109.
- Fritschner, L. M. (2000). Inside the undergraduate college classroom: Faculty and students differ on the meaning of student participation. *The Journal of Higher Education, 71*, 342–362.
- Frymier, A. B., & Houser, M. L. (2016). The role of oral participation in student engagement. *Communication Education, 65*(1), 83–104.
- Gasiewski, J. A., Eagan, M. K., Garcia, G. A., Hurtado, S., & Chang, M. J. (2012). From gatekeeping to engagement: A multicontextual, mixed method study of student academic engagement in introductory STEM courses. *Research in Higher Education, 53*(2), 229–261.
- Greenson, L. E. (1988). College classroom interaction as a function of teacher- and student-centered instruction. *Teaching and Teacher Education, 4*(4), 305–315.
- Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *The Journal of Educational Research, 98*(3), 184–191.
- Hard, B. M., & RaoShah, T. (2022). Developing collaborative thinkers: Rethinking how we define, teach, and assess class participation. *Teaching of Psychology, 49*(2), 176–184. <https://doi.org/10.1177/0098628320986953>
- Howard, J. R., & Baird, R. (2000). The consolidation of responsibility and students' definitions of situation in the mixed-aged college classroom. *Journal of Higher Education, 71*, 700–721.
- Karabenick, S. A., & Sharma, R. (1994). Perceived teacher support of student questioning in the college classroom: Its relation to student characteristics and role in the classroom questioning process. *Journal of Educational Psychology, 86*(1), 90–103.
- Kelly, S. (2007). Classroom discourse and the distribution of student engagement. *Social Psychology of Education, 10*(3), 331–352.
- Keough, S. M. (2012). Clickers in the classroom: A review and a replication. *Journal of Management Education, 36*(6), 822–847.
- Kim, A. S. N., Shakory, S., Azad, A., Popovic, C., & Park, L. (2020). Understanding the impact of attendance and participation on academic achievement. *Scholarship of Teaching and Learning in Psychology, 6*(4), 272–284.
- Leach, L. (2016). Exploring discipline differences in student engagement in one institution. *Higher Education Research and Development, 35*(4), 772–786.
- Mayer, R. E., Stull, A., DeLeeuw, K., Almeroth, K., Bimber, B., Chun, D., Bulger, M., Campbell, J. O., Knight, A., & Zhang, H. (2009). Clickers in college classrooms: Fostering learning with questioning methods in large lecture classes. *Contemporary Educational Psychology, 34*(1), 51–57.
- Micari, M., & Calkins, S. (2019). Is it OK to ask? The impact of instructor openness to questions on student help-seeking and academic outcomes. *Active Learning in Higher Education, 22*, 143–157.
- Mills, S. R., Rice, C. T., Berliner, D. C., & Rousseau, E. W. (1980). The correspondence between teacher questions and student answers in classroom discourse. *Journal of Experimental Education, 48*(3), 195–204.
- Mundelsee, L., & Jurkowski, S. (2021). Think and pair before share: Effects of collaboration on students' in-class participation. *Learning and Individual Differences, 88*, 102015.
- Nadile, E. M., Alfonso, E., Barreiros, B. M., Bevan-Thomas, W. D., Brownell, S. E., Chin, M. R., et al. (2021). Call on me! Undergraduates' perceptions of voluntarily asking and answering questions in front of large-enrollment science classes. *PLoS ONE, 16*(1), e0243731.
- Neumann, R., Parry, S., & Becher, T. (2002). Teaching and learning in their disciplinary contexts: A conceptual analysis. *Studies in Higher Education, 27*(4), 405–417.
- Rissanen, A. (2018). Student engagement in large classroom: The effect on grades, attendance and student experiences in an undergraduate biology course. *Canadian Journal of Science, Mathematics and Technology Education, 18*(2), 136–153.
- Rocca, K. A. (2008). Participation in the college classroom: The impact of instructor immediacy and verbal aggression. *Journal of Classroom Interaction, 43*(2), 22–33.
- Rocca, K. A. (2010). Student participation in the college classroom: An extended multidisciplinary literature review. *Communication Education, 59*(2), 185–213.
- Seidel, T., & Hoppert, A. (2011). Merkmale von Lehre an der Hochschule. Ergebnisse zur Gestaltung von Hochschulseminaren mittels Videoanalysen [Characteristics of teaching at university. Results on characteristics of university seminars using video analyses]. *Unterrichtswissenschaft, 39*(2), 154–172.
- Shi, M., & Tan, C. Y. (2020). Beyond oral participation: A typology of student engagement in classroom discussions. *New Zealand Journal of Educational Studies, 55*(1), 247–265.

- Smith, D. G. (1977). College classroom interactions and critical thinking. *Journal of Educational Psychology*, 69, 180–190.
- Weaver, R. R., & Qi, J. (2005). Classroom organization and participation: College students' perceptions. *The Journal of Higher Education*, 76, 580–601.
- West, R., & Pearson, J. C. (1994). Antecedent and consequent conditions of student questioning: An analysis of classroom discourse across the university. *Communication Education*, 43(4), 299–311.
- Wigfield, A., & Cambria, J. (2010). Students' achievement values, goal orientations, and interest: Definitions, development, and relations to achievement outcomes. *Developmental Review*, 30(1), 1–35.
- Wilkesmann, U., & Lauer, S. (2015). What affects the teaching style of German professors? Evidence from two nationwide surveys. *Zeitschrift Für Erziehungswissenschaft*, 18(4), 713–736.
- Wolf-Wendel, L., Ward, K., & Kinzie, J. (2009). A tangled web of terms: The overlap and unique contribution of involvement, engagement, and integration to understanding college student success. *Journal of College Student Development*, 50(4), 407–428.
- Yaylaci, Ş, & Beauvais, E. (2017). The role of social group membership on classroom participation. *PS: Political Science & Politics*, 50(2), 559–564.
- Zumbrunn, S., McKim, C., Buhs, E., & Hawley, L. R. (2014). Support, belonging, motivation, and engagement in the college classroom: A mixed method study. *Instructional Science*, 42(5), 661–684.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.