

**Anonymous vs. Identifiable Peer Feedback in Secondary Education: Effects on Student
Anxiety and Peer Feedback Quality**

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Abstract

Peer feedback is a valuable learning activity that benefits students in numerous ways. However, its social nature can induce anxiety in students, which may compromise the quality of the feedback they provide. For this reason, it has been suggested to make the feedback process anonymous. The objective of this study was to gain insight into secondary school students' anxiety during peer feedback provision and its influence on the quality of their feedback. In addition, the aim was to examine whether anonymous feedback could decrease anxiety and enhance the quality of peer feedback. To this end, a quasi-experimental study was conducted in ninth and tenth grade classes of a German secondary school. The study compared students who provided written feedback on one of their peers' essays under anonymous conditions ($n = 25$) with students who provided the feedback under identifiable conditions ($n = 25$). The quality of peer feedback was determined by content analysis, and the level of students' anxiety was assessed through questionnaires and follow-up interviews with a subset of students. It was found that students experienced minimal levels of anxiety, which did not have an impact on the quality of feedback provided. Besides, students' anxiety level did not notably differ between the two forms of peer feedback provision. However, there was a slight tendency for the quality of peer feedback to be superior in the anonymous feedback condition. As these findings cannot be generalised, future research, based on a more representative sample, is needed to assess students' anxiety and the quality of peer feedback, and the effect of anonymity on these variables. Nevertheless, the current findings emphasise that anonymity may not always be necessary to prevent students from experiencing anxiety and to preserve the quality of their feedback.

Keywords: peer feedback, emotions, anxiety, anonymity, anonymous peer feedback

Anonymous vs. Identifiable Peer Feedback in Secondary Education: Effects on Student Anxiety and Peer Feedback Quality

Assessment is an integral part of the educational system. At all levels of education, students' performance is regularly assessed in the form of a summative assessment, intending to "capture what a student has learned, [...] and judge performance against some standards" (National Research Council, 2001, p.25). In addition, some educational institutions use assessment as a means to promote student learning (Dixson & Worrell, 2016). This type of assessment, known as formative assessment, provides students with feedback during the learning process to help them improve their learning outcome (Dixson & Worrell, 2016). Although feedback is usually provided by teachers, students are increasingly getting involved in the assessment process themselves, for example through peer feedback (Hovardas et al., 2014).

Peer feedback, also referred to as peer assessment or peer review, involves students giving feedback on the academic work or performance of their peers (Topping, 2009). Typically, peer feedback is a reciprocal activity, meaning that students are both giving feedback on other students' work and receiving feedback on their own (Hovardas et al., 2014). Students may assess each other on various types of products or performances such as oral presentations or group projects (Topping, 2003). Highly common is the use of peer feedback in the context of writing, including first and second language writing in secondary education or academic writing in higher education (Gielen, Peeters, et al., 2010; Huisman et al., 2019; Yu & Lee, 2016). When used for learning purposes, the feedback usually takes the form of written or oral comments, sometimes in combination with numerical scores (Liu & Carless, 2006; Zong et al., 2021).

There are various benefits associated with the use of peer feedback as a learning activity. In general, peer feedback is considered beneficial because it actively engages

students and encourages them to take responsibility for their own learning process (Liu & Carless, 2006; Topping, 1998). In addition, there are a number of differential benefits for students when they receive or give peer feedback. By receiving feedback, students get the chance to revise and thereby improve their products, such as the quality of their writings (Li et al., 2010; Topping, 1998; Wu & Schunn, 2021). Receiving feedback can also foster critical thinking in students, as they have to critically reflect on their peers' feedback and think of a way to implement the comments that they consider useful (Hovardas et al., 2014). Moreover, feedback by peers is often easier to understand for students than feedback provided by teachers, as peers use the same language and typically formulate the feedback in a less complex way (Gielen, Tops, et al., 2010; Hovardas et al., 2014).

Giving feedback, on the other hand, is valuable because it supports students in developing their evaluation skills, which they can use to self-assess and improve their own work (Reinholz, 2016; van Popta et al., 2017; Wu & Schunn, 2021). Besides, reviewing the products of peers and providing feedback based on given assessment criteria allows students to gain a better understanding of the subject matter and the indicators of good performance, which they can also transfer back to their own products (Li et al., 2010; Liu & Carless, 2006).

Anxiety during Peer Feedback Provision

Although peer feedback can be beneficial for students, it may be perceived as an uncomfortable activity. Several studies indicate that students experience anxiety when providing feedback to their peers (Alqassab et al., 2019; Cartney, 2010; Praver et al., 2011). Anxiety can be described as “an emotion characterised by unease, nervousness, and worries about possible negative events and outcomes” (Vattøy & Gamlem, 2023, p.4). In the context of providing peer feedback, students express a fear of being wrong and giving unhelpful feedback (Lu & Bol, 2007; Yu, 2021). Students' anxiety also commonly stems from a fear of being rejected by peers in response to giving them critical feedback (Lu & Bol, 2007).

Students are afraid to offend their peers and thereby cause harm to their relationship (Wang, 2014).

One group of students that may be particularly vulnerable to experiencing anxiety during the provision of peer feedback are adolescent students in secondary schools. During adolescence, individuals have a high need for friendship and belonging (Allen & Kern, 2017; Tomova et al., 2021). Therefore, they tend to be deeply concerned about how they are perceived by their peers (Guyer et al., 2014) and motivated to avoid social risks (Tomova et al., 2021). As giving peer feedback can be seen as a social risk, it is reasonable to assume that it may be particularly anxiety-provoking for adolescents.

There is a concern that students' anxiety during feedback provision not only makes the learning activity unpleasant for them but also negatively impacts the quality of the feedback provided (Alqassab, 2017; Alqassab et al., 2019). The quality of written peer feedback is commonly evaluated in terms of its content and style characteristics (Gielen, Peeters, et al., 2010; Rotsaert et al., 2018). For example, high quality peer feedback needs to contain positive and negative remarks about the peer's current performance (Gielen, Peeters, et al., 2010; Hovards et al., 2014; Sluijsmans et al., 2002). These remarks should be relevant to the assessment criteria for the given task and related to specific aspects of the peer's work (Gielen, Peeters, et al., 2010; Sluijsmans et al., 2002). In addition, the remarks need to be accompanied by an explanation or justification, enabling students to understand why they have done something correct or not (Gielen, Peeters, et al., 2010). Another important characteristic of high-quality peer feedback is the presence of concrete suggestions for improvement (Gielen, Peeters, et al. 2010; Hovards et al., 2014; Sluijsmans et al., 2002). Furthermore, it is essential that the feedback is constructive, meaning that the criticism is formulated in a polite and respectful manner (Darvishi et al., 2022; Fong et al., 2018).

Students' anxiety may affect the quality of their provided feedback in different ways. First, students' fear of negative consequences can make them reluctant to critically assess the work of their peers (Lu & Bol, 2007). Thus, they may intentionally refrain from outlining weaknesses and suggesting corresponding improvements or do so to a lesser extent and instead focus on the strengths of their peers' work. Although feedback on strengths can be helpful (Cho et al., 2006), it is important for students to critically review the work of their peers in order to help them improve, and to apply this critical approach to their own work (Li et al., 2010; Patchan & Schunn, 2015). Second, anxiety may reduce the cognitive resources that students have available for giving feedback because negative academic emotions, including anxiety, are associated with increased task-irrelevant thinking (Pekrun et al., 2002). Thus, students who experience anxiety during feedback provision may not be able to allocate their full cognitive capacity to the task at hand and, as a result, may not provide feedback of the same quality as they would in the absence of anxiety. These two potential pathways demonstrate that there is reason to be concerned about a negative impact of students' anxiety on their feedback quality. However, it is not yet clear to what extent this effect can be observed in the classroom, especially in secondary education.

Anonymous Peer Feedback

Concerns that the social nature of peer feedback negatively impacts students' emotions and their provided feedback have led to the suggestion to make the peer feedback activity anonymous (Panadero & Alqassab, 2019). Anonymity in peer feedback can be bidirectional or unidirectional. In bidirectional anonymity, both the feedback provider and receiver are unknown to each other, whereas in unidirectional anonymity, only one person, usually the feedback provider, remains anonymous (Li, 2017; Panadero & Alqassab, 2019). The idea of making the peer feedback activity anonymous originates from a well-known phenomenon in social psychology, namely that anonymity can lead to deindividuation (Lu & Bol, 2007). In a

state of deindividuation, people feel that they cannot be identified, which reduces their concern about negative consequences and allows them to engage in uninhibited behaviour (Jessup et al., 1990). In the context of peer feedback, this would mean that anonymity could have the potential to reduce students' anxiety and enhance the quality of peer feedback by enabling students to focus on the task and dare to be critical of their peers' work (Panadero & Alqassab, 2019; Ting, 2023; Zaccaron & Xhafaj, 2020). So far, however, only a few studies have investigated the actual effect of anonymous peer feedback on the expected outcome variables, such as students' emotions and the quality of peer feedback. These studies are discussed in more detail below.

With regards to the effect of anonymity on students' emotional experience, previous research has primarily focused on students' feelings of comfort or experience of peer pressure, rather than on anxiety. For instance, Su (2023) found that university students who provided both identifiable and anonymous peer feedback reported to feel more comfortable with the anonymous peer feedback form. In another study, Raes et al. (2015) discovered that university students who gave peer feedback anonymously felt more comfortable and experienced less peer pressure compared to students who gave peer feedback under the non-anonymous condition. Furthermore, Vanderhoven et al. (2015) showed that secondary school students who anonymously gave scores to their peers' presentations reported less peer pressure and fear of failure than students who gave scores in the identifiable form. As fear of failure can be considered a form of anxiety, this finding provides an initial indication that anonymity plays a role in students' anxiety in secondary schools. However, as Vanderhoven et al. (2015) only examined peer assessment in the form of numerical scores, it is still unclear whether anonymity can ease anxiety in the context of qualitative peer feedback. On the basis of the existing studies, it is therefore not yet possible to draw conclusions about the effect of anonymous peer feedback on students' anxiety.

Research on the impact of anonymity on the quality of peer feedback is similarly scarce. Two studies showed that students who remained anonymous during the feedback process provided more critical feedback to peers than students whose identities were known to the feedback receiver (Howard et al., 2010; Lu & Bol, 2007). Moreover, Lin (2018) found that pre-service teachers in the anonymous feedback condition gave more cognitive feedback than students in the non-anonymous condition. Cognitive feedback refers to feedback that contains comments on the strong and weak points of the work as well as suggestions for improvement (Lin, 2018). Although these studies point towards a positive impact of anonymity on the quality of peer feedback, they have all been conducted in higher education, so no conclusions can be drawn for secondary education. Besides, the existing studies assessed the peer feedback quality by considering only one or two quality criteria of peer feedback such as the presence of critical comments. However, as mentioned earlier, there are more characteristics that are essential for good peer feedback, which need to be considered in order to draw meaningful conclusions on the effect of anonymity on peer feedback quality.

Apart from limited research on the effect of anonymity on students' anxiety and peer feedback quality, no study has yet investigated these variables in combination. Thus, despite the assumption that anonymity may improve the quality of the peer feedback by easing students' fears of negative consequences (Alqassab et al., 2019; Su, 2023), the role of anxiety in mediating the relation between anonymity and peer feedback quality has not been researched so far.

Present Study

In line with the identified research gaps, the present study pursues three specific aims. The first aim is to measure the level of anxiety experienced by secondary education students when giving peer feedback and to assess its impact on the quality of their provided peer feedback. Secondly, the study aims to examine the effect of anonymous peer feedback on

students' anxiety and the peer feedback quality. The final aim is to explore the mediating role of anxiety in the relation between anonymity and peer feedback quality. These three aims are addressed by answering the following research questions:

- (1) To what extent do secondary school students experience feelings of anxiety when providing feedback to their peers?
- (2) How does the anxiety of secondary school students differ when they provide peer feedback in an anonymous form as opposed to an identifiable form?
- (3) How does the quality of peer feedback differ when secondary school students provide peer feedback in an anonymous form as opposed to an identifiable form?
- (4) Do secondary school students' feelings of anxiety influence the quality of their provided peer feedback?
- (5) Does secondary school students' anxiety mediate the effect of the peer feedback form (anonymous vs. identifiable) on the quality of their feedback?

Method

Design

The current study employed a quasi-experimental design comparing two conditions. In the first condition, students provided anonymous written feedback on a text written by one of their classmates. The anonymity was bidirectional, so both the feedback giver and receiver remained anonymous throughout the peer feedback process. In the second condition, students provided the written peer feedback under identifiable conditions, meaning that students knew to whom they were giving and from whom they were receiving feedback.

Participants

The participants of this study were students from three classes (grade nine and ten) of a German *Gymnasium*, which is the most advanced form of secondary school in Germany. The school is located in the federal state of Lower Saxony, close to the German-Dutch border.

The two tenth-grade classes were assigned to either the anonymous or the identifiable peer feedback condition. The ninth-grade class was divided into two groups of equal size, which were then similarly assigned to the two conditions. To be included in the study, students had to be present in the first and third part of the study and be fluent in German, the language in which the study was conducted. Further details on sample size and participant characteristics are provided in the results section.

Materials

The study required the use of various materials, all of which were developed and applied in German. However, a corresponding English version of these materials has been included in the appendices to ensure comprehensibility for all readers.

Argumentative Essay

An argumentative essay was selected as the product for the peer feedback activity. As all participating students had been dealing with argumentative essay writing in their German class for about three weeks prior to the start of the study, this type of writing task offered the most value to the students. The topic of the essay was adapted to the grade level. The ninth graders wrote the essay about fairly produced smartphones, while the tenth graders wrote the essay about ‘warning shot detention’, which refers to a short prison sentence for adolescents to deter them from committing further crimes. A text from the students’ textbook informed students about the topic and thus served as a starting point for writing the argumentative essay.

Rubric for Assessing Argumentative Essay

To assist students in providing feedback on their peers' essays, a rubric for assessing an argumentative essay was created (see Appendix B). The rubric contains ten assessment criteria, referring to the introduction, thesis statement, arguments in favour and against the author’s position, support for the arguments in favour and against the author’s position (e.g.,

evidence, examples), structure of arguments, conclusion, expression/ style, and use of tense. The included criteria were based on the criteria that are typically taught by the teachers of the participating classes to ensure consistency in the instructions given to students. Most of these criteria also align with the characteristics of high-quality argumentative essays that have been used in previous research (e.g., Noroozi et al., 2016). For each criterion, the rubric specifies and describes three quality levels: (1) not meeting the standard, (2) partly meeting the standard, (3) meeting the standard. Two teachers evaluated the rubric and deemed it suitable for the students, who were already familiar with the assessment criteria and had worked with a rubric before.

Peer Feedback Training

A peer feedback training session was developed to help students learn how to give feedback based on assessment criteria. The session consisted of two parts. The first part introduced students to the concept of peer feedback, including its benefits, the characteristics of good feedback and the steps involved in giving feedback. The information was provided in the form of a PowerPoint presentation (see Appendix C) and a fact sheet (see Appendix D). The second part of the session included an exercise that gave students the opportunity to practise giving feedback on a sample essay, using the rubric and a feedback form (see Appendix E). The feedback formulated by the students was then discussed in class in order to assess whether it met the criteria of good peer feedback.

Questionnaires

Anxiety. Students' anxiety during the peer feedback provision was assessed with the German short version of the state scale of the State-Trait Anxiety Inventory (STAI-SKD, Englert et al., 2011), which has been validated for the assessment of state anxiety in the educational setting (Bertrams & Englert, 2013). The STAI-SKD consists of five items that describe emotional states (e.g., "I am nervous"). Students are asked to indicate to what extent

they experience each of these emotional states on a four-point scale ranging from 1 (not at all) to 4 (very much). The mean score of the five items was used as the indicator of students' anxiety.

As state anxiety is a transitory emotion (Spielberger et al., 1971), the STAI-SKD asks about the emotions experienced in the present moment. However, in the current study, anxiety was measured shortly after students finished the feedback to avoid disrupting their cognitive processing. Therefore, for the purpose of this study, the instruction of the questionnaire was rephrased. Instead of asking students how they “feel in the present moment”, they were asked how they “felt a moment ago while giving feedback”. Similarly, the tense of the items was changed from the present tense (e.g., “I feel nervous”) to the past tense (“I felt nervous”). In this study, the STAI-SKD showed acceptable internal consistency ($\alpha = .74$).

Experience with Peer Feedback. Given that previous research has shown that students' emotions and the feedback they provide can be influenced by In the second part, the feedback formulated by the students was also discussed in class in order to assess whether it met the criteria of good peer feedback. their experience with peer feedback (Alqassab, 2016; Li et al., 2010), students' experience with written peer feedback was assessed as a potential covariate using a single item (“Have you given written feedback on the work of your peers before?”) with four response options (1 = No, never; 2 = Yes, once; 3 = Yes, a few times; 4 = Yes, often). During the analysis, the options “a few times” and “often” were merged into the category “more than once” because a clear definition of the response options was missing, which led to confusion among some students when filling in the questionnaire.

Anonymity Check. Two items assessed whether students in the anonymous condition indeed experienced the peer feedback process as anonymous. One item checked whether students were anonymous as feedback providers and one item checked whether the author of the essay remained anonymous.

Interview

In order to complement the results of the quantitative data analysis and to gain a deeper insight into students' experience of anxiety during the peer feedback activity and possible effects on the feedback they provided, semi-structured interviews were conducted with volunteering students. Each interview consisted of four predefined questions (see Appendix G). In addition, follow-up questions such as “how” or “why” questions were used to encourage the interviewees to explain or elaborate on their responses.

Procedure

Prior to the start of the study, ethical approval was obtained from the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente. Further approval was granted by the school authority of Lower Saxony, Germany. In addition, both the students and their parents gave their informed consent to participate and to have their data used for this research. The information sheet and consent form can be found in Appendix A.

Between 27th November and 12th December 2023, the study was carried out in three consecutive German lessons (two 90-minute lessons, one 45-minute lesson). The lessons took place on different days in each class, in accordance with the regular timetable of the participating classes. As the study was integrated into the curriculum, all students were obligated to participate in the educational activities, regardless of whether their data was used for the research.

In the first lesson (90 minutes), the peer feedback training took place. First, the researcher provided a theoretical introduction to peer feedback for about 15 minutes. After that, students received the rubric for assessing an argumentative essay, which was discussed in class by the teacher. The next 45 minutes were devoted to the peer feedback practice. Students received an example essay and the feedback form and were instructed to provide

feedback on it using the rubric. Some students presented the feedback they had formulated to the class. During a plenary discussion, the teacher and students assessed whether the feedback was appropriate and complete, and improved it if necessary.

In the second lesson (45 minutes), students were instructed by the teacher to write an argumentative essay based on a text from their textbooks. Students who did not finish their essay within the lesson were requested to finish it at home. To ensure that all students bring the essay to the next lesson, the teachers reminded students via email on the day before the third lesson.

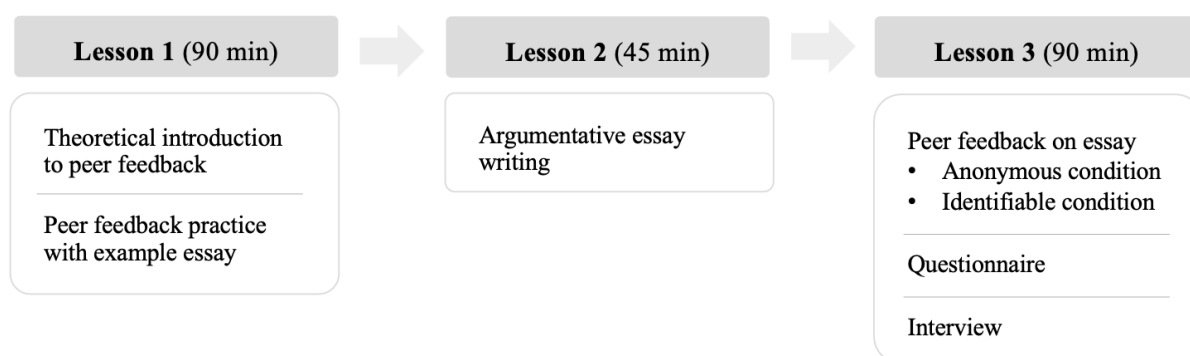
During the third lesson, students first received instructions to generate their unique personal code and to note it on all forms during the lesson. The code was necessary to link multiple pieces of data from the same person without collecting any personal identifiable information from the students. The code was not based on their own personal data, so even students who knew each other could not trace the code back to their classmates. This ensured that the code did not compromise students' anonymity in the anonymous peer feedback condition.

After constructing the code, students handed in their argumentative essays, which were then randomly distributed by the teachers to other students. In the anonymous condition, the distribution was done anonymously, whereas in the identifiable condition, students knew to whom they were giving feedback and from whom they would receive it. Since four students did not bring an essay to the third lesson, some essays were reviewed by more than one student. Students were given 45 minutes to review their peers' essays and provide feedback by using the rubric and feedback form. Students were asked to provide feedback on all the criteria listed in the rubric. Immediately after the students had completed the peer feedback, they were asked to fill in the questionnaires.

In the remaining time of the lesson, individual interviews were conducted with volunteering students. In total, ten students from the anonymous condition and nine students from the identifiable condition were interviewed for approximately three minutes. After the lesson, students' essays and peer feedback were digitised so that the teachers could return the sheets to the students as soon as possible. Students were instructed by the teachers to use the feedback to improve their essays in preparation for the upcoming exam. Figure 1 illustrates the sequence of the main components of this study.

Figure 1

Study Procedure



Data Analysis

Qualitative Analysis

First, content analyses of students' peer feedback and essays were conducted. For the assessment of the quality of students' provided peer feedback, a coding scheme was developed (see Appendix F). The scheme consists of five criteria that are characteristic to high-quality feedback. Four of them were based on the criteria by Gielen, Peeters et al. (2010), including (1) relatedness to the assessment criteria, (2) specificity, (3) presence of an explanation/ justification, and (4) presence of suggestions for improvement. In addition, the use of constructive language was included as a quality criterion, similar to the study by Darvishi et al. (2022). Constructive language implies that feedback is given in a polite, professional, and respectful tone (Darvishi et al., 2022).

Each of the five quality criteria was assessed with a score between zero (criterion is not met) and three (criterion is fully met). The final score was calculated by adding up the points for all criteria. A final score of zero represents the lowest possible quality of peer feedback, while a score of 15 represents the highest quality. Before the coding scheme was used to code students' peer feedback, its applicability was tested on the feedback provided by three students during the peer feedback training. During the coding process, the researcher did not know whether the feedback was given by a student in the anonymous or identifiable condition in order to avoid bias. To check inter-rater reliability, another person coded 40% of the peer feedback. Krippendorff's alpha was .87, indicating high agreement between the coders.

The quality of students' argumentative essays was coded with the same rubric that was used by students while providing feedback on their peers' essays (see Appendix B). Each of the ten criteria in the rubric was rated with a score between zero and two. Zero points were awarded if the essay did not meet the standard for the criterion, one point if it partially met the standard and two points if it met the standard. The scores for all ten criteria were added together to obtain a final score, ranging from zero to 20. To determine inter-rater reliability, a second rater coded 30% of the essays. The reliability was found to be high, as evidenced by a Krippendorff's alpha of .91.

Secondly, the interviews were analysed. This involved transcribing the recorded interviews and developing a coding scheme through an inductive coding process. The final coding scheme (see Appendix I) was then applied to all interviews to code the students' feelings, the underlying reasons, and the impact of their feelings on the provided feedback. Since the focus of this study was on students' experience of anxiety, only interviews with students who reported anxiety-related feelings were analysed with regard to the impact of their feelings on their feedback. Once the interviews had been coded, a sample quotation for

each code was translated from German into English and the frequency of the codes was determined.

Quantitative Analysis

The results of the content analysis and the students' responses to the questionnaires were entered into a data set in Excel and then imported to the statistical software programme SPSS. In SPSS, the data set was first examined for missing data and outliers, and new variables were computed. Descriptive statistics were used to determine whether the students were indeed anonymous during the feedback activity and to describe the sample characteristics. Furthermore, preliminary analyses were performed, including Shapiro-Wilk tests to assess normality and Levene's tests to check for homogeneity of variance across the conditions. Since normality was violated for anxiety and peer feedback quality (see results), medians with interquartile ranges were used to summarise these variables and non-parametric tests were chosen for the analyses. Preliminary analyses also included testing the assumptions for linear regression (i.e., linearity, homoscedasticity, normality). Moreover, the relationship between the background variables and study variables was assessed using bivariate correlations (Kendall's tau) and Mann-Whitney U tests to identify potential covariates for the regression analyses.

Next, statistical analyses were conducted to answer the research questions. To determine the extent to which students experienced anxiety (RQ1), median and interquartile range were calculated for anxiety. Differences in anxiety between conditions were tested using the Mann-Whitney U test (RQ2). To identify differences in peer feedback quality between conditions (RQ3), median and interquartile range were calculated for the overall peer feedback quality and each of the quality criteria and Mann-Whitney U tests were performed. The influence of students' anxiety on the quality of their provided peer feedback (RQ4) was examined by a linear regression analysis. Lastly, a mediation analysis was conducted with

condition as the independent variable, peer feedback quality as the dependent variable and anxiety as a mediator (RQ5).

Results

Sample Characteristics

The study sample initially comprised 62 students. Nine students were excluded because they were absent during the first or third lesson of the study. Another three students were excluded because they were not fluent in German. This resulted in a final sample of 50 students, of which 27 students were male, 22 students were female, and one student preferred not to say. About half of the participating students were in grade nine (48%) and half in grade ten (52%). Participants had a mean age of 14.82 years ($SD = 0.72$). The majority of students had previously given written feedback to peers, with 14% saying they had done it once and 76% saying they had done it more than once. There were 25 students in each condition, with an equal number of ninth and tenth graders and no remarkable differences in terms of gender distribution or experience with peer feedback.

Preliminary Analyses

First, normality and homogeneity of variance were checked for anxiety and peer feedback quality. Concerning normality, Shapiro-Wilk tests showed that the distribution of anxiety significantly departed from normality in both the identifiable ($p < .001$) and anonymous condition ($p < .001$). For peer feedback quality, Shapiro-Wilk tests similarly revealed significant deviation from normality in both the identifiable ($p = .040$) and anonymous condition ($p = .030$). Homogeneity of variance was checked with Levene's tests based on median. The results of Levene's tests indicated similar variance in the identifiable and anonymous condition for both anxiety, $F(1, 48) = 1.22, p = .275$, and peer feedback quality, $F(1, 48) = 1.98, p = .166$.

Second, the relation between background variables and study variables (i.e., anxiety, peer feedback quality) were examined. Bivariate correlations using Kendall's tau showed that neither age, prior experience with peer feedback or essay quality were significantly correlated with anxiety and peer feedback quality. In addition, Mann-Whitney U tests revealed that there were no significant differences in anxiety and peer feedback quality between gender and grade level. Therefore, none of the background variables were included as a covariate in the main analyses. The results of the bivariate correlations and Mann-Whitney U tests are summarised in Appendix H.

Third, it was checked whether students in the anonymous condition indeed remained anonymous during the feedback process. The responses to the questionnaire showed that 18 students (72%) did not know to whom they were giving feedback and 22 students (88%) did not expect their classmate to know that the feedback was from them, thus they were anonymous as feedback providers. To address potential bias in the results due to the students who did not feel anonymous as feedback providers, all analyses comparing the two conditions were performed twice: once with all students and once by excluding three students who did not perceive themselves to be anonymous during the feedback provision. Since the results did not differ substantially, only the analyses based on the entire sample are reported.

Main Analyses

Feelings of Anxiety (RQ1 & RQ2)

The quantitative analysis of the answers to the STAI-SKD revealed that the participating students had a median anxiety score of 1.1 ($IQR = 0.4$), implying that they overall did not tend to feel anxious during the peer feedback process. A Mann-Whitney U test indicated that students' anxiety level in the anonymous condition ($Mdn = 1.2$, $IQR = 0.6$) did not significantly differ from students' anxiety level in the identifiable condition ($Mdn = 1.0$, $IQR = 0.3$), $U = 402.0$, $z = 1.86$, $p = .062$, $r = 0.26$.

In addition to the quantitative data, the interviews gave insight into students' feelings during the peer feedback provision and the underlying reasons. Out of 19 interviewed students, eight students mentioned that they were nervous or worried while giving the feedback, which can be considered feelings related to anxiety (Englert et al., 2011). However, both in the anonymous and identifiable condition, the students experienced these feelings only to a low extent, evident by phrases such as “a bit worried” or “a little nervous”, which supports the numerical findings. Three different reasons for students’ nervousness and worry emerged from the interviews. Two students seemed to be nervous due to participating in the study, with one student explaining that it is “not just something that normally happens in class.” Another student’s fear was due to “somehow writing the wrong thing, giving the wrong feedback”. For the other students, the nervousness or worry was related to the anticipated reaction of the classmate who would receive their feedback. More specifically, they worried about how their feedback would make their classmate feel: “If I write something that he does not see that way, it might hurt or offend him” or “[...] then the person is somehow sad or something.” Another person was more concerned about being judged by their classmate: “If you write something there, criticism and such, [...] they sometimes criticise your criticism”.

Nevertheless, the majority of the students interviewed did not show signs of anxiety, which is in line with the quantitative results. Several students reported feeling “neutral” because they knew each other or had experience with giving feedback to peers. In addition, some students indicated positive feelings, such as contentment or joy (see Appendix I).

Peer Feedback Quality (RQ3)

The median quality of students’ peer feedback was 9.5 ($IQR = 3.0$), implying that students typically provided feedback of mediocre quality to their peers. When examining the quality criteria individually, it becomes evident that the criteria ‘reference to assessment

criteria' and 'constructive language use' were the criteria most fulfilled by the students. The criteria 'presence of explanation' and 'presence of suggestion for improvement' were met to a lesser extent. The descriptive statistics for peer feedback quality are summarised in Table 1.

Table 1

Descriptive Statistics for Peer Feedback Quality by Condition

Variable	Full sample ($N = 50$)		Identifiable condition ($n = 25$)		Anonymous condition ($n = 25$)	
	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>
Peer feedback quality (total)	9.5	3.0	9.0	4.0	10.0	2.0
Assessment criteria	3.0	1.0	3.0	1.0	3.0	1.0
Explanation	1.0	0.0	1.0	0.0	1.0	1.0
Suggestion for improvement	1.0	2.0	0.0	2.0	1.0	2.0
Specificity	2.0	1.0	2.0	1.0	2.0	1.0
Constructive language	3.0	0.0	3.0	0.0	3.0	0.0

Note. Peer feedback quality (total) ranges from 0 and 15, with higher scores indicating higher quality. The scores for the individual quality criteria of peer feedback range from 0 (not met) to 3 (fully met).

A Mann-Whitney U test revealed that the overall peer feedback quality in the anonymous condition ($Mdn = 10.0$, $IQR = 2.0$) did not significantly differ from peer feedback quality in the identifiable condition ($Mdn = 9.0$, $IQR = 4.0$), $U = 401.50$, $z = 1.76$, $p = .079$, $r = 0.25$. Post hoc analyses were conducted to investigate differences between feedback conditions for the five quality criteria separately. To account for the risk of a type I error when making multiple comparisons, the Bonferroni correction was applied, resulting in an adjusted significance level of $p = .01$. The analyses showed that there was a significant

difference in the fulfilment of the quality criterion ‘explanation’ between conditions, $U = 420.0$, $z = 2.65$, $p = .008$, $r = 0.37$. The students in the anonymous condition met the criterion to a higher extent ($Mdn = 1.0$, $IQR = 1.0$) than students in the identifiable condition ($Mdn = 1.0$, $IQR = 0.0$). For the other quality criteria, no significant differences were found.

Influence of Anxiety on Peer Feedback Quality (RQ4)

A simple linear regression was conducted to predict peer feedback quality based on anxiety. Since the assumption of homoscedasticity was violated, wild bootstrap was applied (Astivia & Zumbo, 2019). The regression analysis showed that anxiety did not significantly predict peer feedback quality, $B = 1.02$, 95% CI $[-0.15, 2.34]$, $p = .087$.

Moreover, the interviews provided insight into how students themselves perceived their anxiety-related feelings to influence the feedback they gave. It seemed that for two students, the fear of a negative reaction by their classmate led to a tendency to give more positive feedback. For example, one of them indicated that she wrote “about the same amount of good and negative things” in order to “keep it balanced”. Another student indicated that if she was not sure whether something in the text was good or not, she tended to “write it on the positive side”. Two other students reported that because of their worry or nervousness, they either formulated their criticism “in a friendlier way” or “not so concrete, but vague”. In contrast, four students who experienced anxiety-related feelings when giving feedback did not think that their feelings affected their feedback. They explained that they gave the feedback “regardless” of being nervous, that they “could deal” with their feelings or that they “did not see emotions playing a role”.

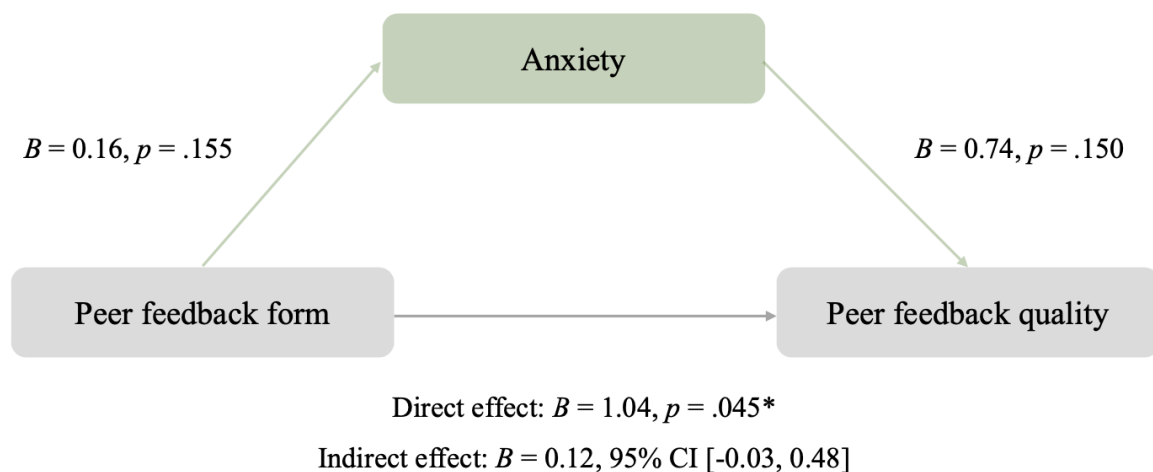
Mediating Effect of Anxiety on the Relation Between Peer Feedback Form and Peer Feedback Quality (RQ5)

To examine whether anxiety mediates the relation between peer feedback form and peer feedback quality, a mediation analysis was conducted in SPSS using the PROCESS

macro 4.2 by Hayes (2022) with 5,000 bootstrapping samples and 95% confidence interval. In addition, the heteroskedasticity-consistent standard error inference was applied to account for violation of homoscedasticity. The analysis revealed that the total effect of peer feedback form on peer feedback quality was significant, $B = 1.16$, 95% CI [0.10, 2.22], $p = .032$. This means that, when anxiety was not considered in the model, the peer feedback form predicted peer feedback quality, with students in the anonymous condition showing higher peer feedback quality than students in the identifiable condition. The indirect effect of the peer feedback form on peer feedback quality through anxiety was not significant since the confidence interval contained zero, $B = 0.12$, 95% CI [-0.03, 0.48]. The direct effect of the peer feedback form on peer feedback quality, while controlling for anxiety, was significant, $B = 1.04$, 95% CI [0.03, 2.06], $p = .045$. Figure 2 illustrates the mediation model.

Figure 2

Model of Peer Feedback Form as a Predictor of Peer Feedback Quality, Mediated by Anxiety



Note. The confidence interval for the indirect effect is a bootstrapped confidence interval based on 5,000 samples.

* $p < .05$

Discussion

The focus of the present study was on secondary school students' experience of anxiety during the provision of peer feedback and its influence on the quality of their feedback. Moreover, the study investigated the effect of anonymity on students' anxiety and feedback quality. To this end, the study compared secondary school students who provided written feedback to one of their peers under either identifiable or anonymous conditions. The study yielded mainly unexpected findings, which will be discussed by examining the existing literature and providing potential explanations.

First, it was found that the participating students experienced almost no anxiety when giving feedback to their peers, regardless of whether the feedback was given in the identifiable or anonymous form. This is surprising given that several studies showed that students report uncomfortable feelings such as anxiety during the peer feedback process (e.g., Alqassab et al., 2019; Cartney, 2010; Praver et al., 2011). The present finding also contradicts the expectation that the provision of peer feedback would be perceived as particularly frightening by secondary school adolescents, given the importance of social belonging during this phase and the tendency of adolescents to avoid social risks (Tomova et al., 2021).

There are several ways to explain the present finding. One possible explanation is that providing written comments, as opposed to scores as in the study by Vanderhoven et al. (2015), may be less anxiety-provoking, reducing the need for anonymity. Moreover, certain characteristics of the participating classes could explain why students did not experience anxiety in any of the conditions. For instance, a positive classroom climate might have contributed to students experiencing psychological safety in their class (Wang et al., 2020). Psychological safety describes a state in which "people feel confident that the surrounding interpersonal context is not threatening, and they will not be embarrassed or punished for expressing themselves" (Zhang et al. 2010, p.427). In that case, there would be no need to

make the peer feedback activity anonymous since students are not afraid to express criticism towards their peers non-anonymously.

Another potential explanation is that students were already used to giving feedback in the identifiable form, which became clear during the interviews. Thus, even if they initially felt anxious about giving peer feedback, they might have come to realise over time that their fears were unjustified, leading them to no longer experience anxiety at the time of the study. As a result, the form of peer feedback provision did not matter. The notion that students' prior experience with peer feedback contributes to the minimal anxiety level is consistent with the students' own statements in the interviews. Some students reasoned that they did not feel anxious because they had given feedback to their classmates many times before.

Second, with regard to the difference in peer feedback quality between the identifiable and the anonymous peer feedback form, the results are not entirely clear. On the one hand, the analysis conducted to answer the research question showed that the quality of peer feedback was not significantly different between the peer feedback forms. On the other hand, one could argue that there is a trend given that the p-value was below 0.1 and the total effect in the mediation model showed a significant effect of feedback form on peer feedback quality. Hence, there seems to be at least a tendency for students to provide peer feedback of higher quality under the anonymous condition. The separate analysis of the different quality criteria also supports this notion, as it was found that students who gave anonymous feedback provided explanations for their comments significantly more often than students who were identifiable during the feedback provision.

A possible reason for finding a trend, rather than clear-cut differences in the peer feedback quality between students in the identifiable and anonymous condition may lie in the specific quality criteria assessed in this study. Previous studies that have revealed a positive effect of anonymity on peer feedback quality have mainly viewed quality in terms of whether

students provided critical comments (Howard et al., 2010; Lu & Bol, 2007). In contrast, the present study assessed peer feedback quality based on multiple criteria, including, for instance, relatedness to assessment criteria, specificity, or use of constructive language. Hence, it may be that anonymity is less relevant to these criteria. The provision of explanations could be the only quality criterion that was clearly affected by anonymity because students in the anonymous condition might have seen a higher necessity to explain their remarks. More specifically, they might have realised that under anonymous conditions, as opposed to the identifiable form to which they are used, they cannot verbally explain the feedback to their peers. Thus, they had to provide an explanation in written form.

Third, anxiety was not found to be a significant predictor of students' peer feedback quality. This finding is unexpected since a previous study showed that anxiety negatively predicted peer feedback accuracy (Alqassab et al., 2019) and anxiety is known for its negative effect on performance on complex tasks (Pekrun, 2011). One possible explanation for not finding a significant negative effect is that students who reported anxious feelings only experienced them to a low extent. A low level of anxiety is unlikely to cause task-irrelevant thoughts and thus to compromise the performance, or in this case, the quality of peer feedback (Hooda & Saini, 2017). Instead, a low level of anxiety can be beneficial and increase students' motivation to engage in a task (Hooda & Saini, 2017). This could also explain why the regression coefficient was positive instead of negative as expected. To illustrate this point, it may be that students who were a slightly afraid of writing wrong feedback felt motivated to think more carefully about their comments and to provide more specific and justified feedback. Although this is a plausible explanation, it is important to keep in mind that the positive influence of anxiety on peer feedback quality was not significant, which means that the result could be due to chance alone.

Lastly, it was found that anxiety did not mediate the relation between the peer feedback form and peer feedback quality. However, this finding was to be expected after finding that anxiety did not influence peer feedback quality.

Limitations

The results have to be considered in the light of some limitations. First, for practical reasons, the participating tenth-grade students had to remain within their classes during the study procedure. Therefore, it was not possible to randomly assign each student to one of the two conditions, but only to randomly assign the entire class. Consequently, it might be that other extraneous variables, such as class-specific factors, have influenced the results (Kirk, 2009). The second limitation concerns the implementation of anonymous peer feedback. Due to challenges encountered when applying anonymity in face-to-face lessons, bidirectional anonymity could not be ensured for all students. Although the lack of anonymity of some feedback providers did not appear to affect the results, it is unclear whether students' awareness of who they were giving feedback to might have influenced the findings.

A further limitation is that students' anxiety was assessed after they had finished giving feedback to their peers, rather than during the feedback provision. The delay between the time students experienced the emotions and the time they reported them could have led to inaccurate self-reports. This is because students may not remember their emotions accurately, or they may unintentionally indicate their emotional state for the moment they complete the self-report (Lal et al., 2021). However, interrupting students during the feedback provision in order to have them fill in the anxiety questionnaire was not considered an appropriate alternative as it could also compromise the results, for example with regard to the feedback quality. Finally, it needs to be noted that the study was conducted in a single school, which bears the risk that the results are due to the specific characteristics of this school. Therefore, the findings cannot be generalised to a wider population of secondary school students.

Implications for Research and Practice

Given the limitations of the present study, it is recommended that future research re-examines the research questions of this study using an experimental design and a larger sample that includes students from different secondary schools. In addition, future studies should control for the potential impact of classroom climate and students' psychological safety. Classroom climate, for example, is related to students' engagement, performance, and emotions in school (Wang et al., 2020). It may therefore influence how students feel when giving peer feedback and whether they benefit from the anonymous form of feedback, highlighting the need to consider this factor.

Apart from that, it is advised that future research applies additional methods of measuring anxiety in order to account for the potential inaccuracy of self-reports. One option is to use measures of physiological arousal, such as heart rate or skin conductance, as they provide objective and real-time data and can be used in conjunction with self-report measures, as has been done in research on test anxiety (Roos et al., 2021). Moreover, future studies examining the impact of anonymity on the quality of peer feedback should consider both the amount of critical feedback and the quality criteria from the present study. By addressing all quality criteria in a single study, it would be possible to determine the relative importance of anonymity for each quality criterion.

For educational practice, the present findings have limited implications, particularly due to their lack of generalisability. Nevertheless, the results suggest that teachers should not implement anonymity too readily in their classroom, even if future research confirms that it helps to alleviate anxiety. Instead, it is advisable that teachers first assess whether students in a certain class perceive the feedback process as anxiety-provoking. If students are not anxious or only to a minimal extent, it may be preferable to conduct peer feedback in the identifiable form, as this allows students to engage in a dialogue with their peers about the provided

feedback, which can have additional benefits for both the feedback receiver and provider (Zhu & Carless, 2018).

Conclusion

In conclusion, the current findings emphasise that secondary school students do not necessarily perceive giving feedback to peers as anxiety-provoking. Therefore, it cannot be generally assumed that an anonymous peer feedback process is necessary to prevent students from feeling anxious and to enable them to provide peer feedback of appropriate quality. Further research is needed to determine under which circumstances students' emotions and the quality of their peer feedback may or may not benefit from the anonymous form peer feedback provision.

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Appendix A

Information Sheet and Informed Consent

Study Information Sheet

Dear students and parents,

In December 2023, a study will be carried out in German lessons in the 9th and 10th grade in cooperation with the University of Twente in the Netherlands. The study is part of a master's thesis and investigates a particular learning activity, namely peer feedback. In this learning activity, students give each other feedback on their academic performance (e.g., an essay) in order to improve it. The aim of the study is to find out how students implement this method and how they experience it.

The study takes place during school hours. The following data will be collected: students' name, gender, age, and their answers to the questionnaire about their experience with peer feedback. Some students will also be invited for a short interview on the same topic. As the interview will be recorded, separate consent is required for participation in the interview.

All collected data is processed and analysed anonymously, so that no conclusions can be drawn about individual students. The data will be used exclusively for scientific purposes and treated as strictly confidential. The audio recording of the interview will be deleted immediately after the interview has been transcribed. Participation in the study is voluntary and can be terminated at any time without giving reasons and without disadvantages for the students. Participation is not associated with any risks.

If you agree to participate in the study, please sign the enclosed consent form and return it to the teacher.

If you have any questions or concerns, please feel free to contact me at any time.

Kind regards,
Ronja Rosenkranz

Master Student Educational Psychology
University of Twente, Enschede
r.rosenkranz@student.utwente.nl

Declaration of consent (parents)

Name of student: _____

School class: _____

Consent of parents / legal representatives

- I have read and understood the information about the study.
- I voluntarily give my consent for my daughter/ son to be part of this study and I agree that the data can be used as described.
- I understand that we have the option to withdraw the consent and that my daughter/son has the right to answer individual questions but not others. Refusal or revocation will not result in any disadvantages for me or my daughter/son.

Signature parent / legal representative: _____

Additional consent for participation in the interview

- I give my consent for my daughter / son to take part in the interview.
- I agree that the interview may be recorded and that the audio recording may be stored until the interview has been transcribed.

Signature parent / legal representative: _____

Declaration of consent (student)

Name of student: _____

School class: _____

Consent of the student

- I have read and understood the information about the study.
- I voluntarily consent to participate in this study, and I agree that the data can be used as described.
- I understand that I have the option to withdraw my consent and that I have the right to answer some questions but not others. Refusal or withdrawal will not result in any disadvantage to me.

Signature student: _____

Additional consent for participation in the interview

- I voluntarily agree to take part in the interview.
- I agree that the interview may be recorded and that the audio recording may be stored until the interview has been transcribed.

Signature student: _____

Appendix B

Rubric Essay Quality

Criterion	Does <i>not</i> meet the standard (0 points)	<i>Partly</i> meets the standard (1 point)	Meets the standard (2 points)
Introduction	The topic of the essay is not introduced.	The topic of the essay is introduced, but without arousing the reader's interest.	The essay is introduced in an interesting way using an exemplary situation, experience, question or quotation.
Thesis statement	The thesis statement is missing.	The thesis statement is present, but incomplete or imprecisely formulated.	The thesis statement is clearly and thoroughly presented.
Arguments for author's position	No or only one argument is presented in favour of the author's position.	Two arguments are presented in favour of the author's position.	Three arguments are presented in favour of the author's position.
Support of arguments for author's position	None or only one argument in favour of the author's position is supported by examples, evidence etc.	Two arguments in favour of the author's position are supported by examples, evidence etc.	Three arguments in favour of the author's position are supported by examples, evidence etc.
Arguments for opposing position	No or only one argument is given in favour of the opposing position.	Two arguments are presented in favour of the opposing position.	Three arguments are presented in favour of the own position.
Support of arguments for opposing position	None or only one argument for the opposing position is supported by examples, evidence etc.	Two arguments for the opposing position are supported by examples, evidence etc.	Three arguments for the opposing position are supported by examples, evidence etc.
Structure of the arguments (Adherence to the hourglass or "ping-pong technique")	The structure of the arguments follows neither the sandglass nor the ping-pong principle.	<i>Hourglass technique</i> - First, the arguments of the opposing side are addressed, then the arguments of one's own position.	<i>Hourglass technique</i> - First, the arguments of the opposing side are addressed, then the arguments of one's own position. - The two points of view are linked by a transition. - Formulations are used to recognise

			the intensification of the arguments.
		<i>“Ping-pong technique”</i> - The weakest argument of the opposing side is mentioned first. - The discussion ends with the strongest argument of the own position.	<i>“Ping-pong technique”</i> - The weakest argument of the opposing side is mentioned first. - The discussion ends with the strongest argument of the own position. - The arguments are organised according to main points (factual aspects). - The arguments are invalidated using appropriate formulations.
Conclusion	The conclusion does not refer to the thesis statements or is missing completely.	The conclusion is present and refers to the thesis statement, but does not contain a compromise, a demand, a wish or an outlook.	The conclusion is clearly formulated and makes explicit reference to the thesis statement. The conclusion builds on the introduction, offers a compromise, makes a request or wish, or gives an outlook.
Expression & style	No or hardly any conjunctions are used. The essay is formulated in an unobjective and/or judgmental way.	Conjunctions are occasionally used. The essay is mainly factual and non-judgmental.	Many conjunctions are used to make the text vivid. Throughout, the essay is factual and non-judgmental.
Tense	The text is written in a tense other than the present tense.	Most of the text is written in the present tense.	The entire text is written in the present tense.

Appendix C

Peer Feedback PowerPoint Presentation



Peer Feedback

What is peer feedback?

- Learning activity in which students give each other feedback on their academic work or performance (e.g., on an essay or an oral presentation)
- There are various ways to give peer-feedback:
 - Grade/ score or comments
 - In oral or written form
 - One-to-one or in class
 - Anonymous or non-anonymous



Why is peer feedback useful?

Receiving feedback

- Understand what you have already done well and what you still need to work on
- Revise your work and improve your performance

Giving feedback

- Better understand assessment criteria
- Train evaluative skills → can be used to self-assess and improve own work
- Learn from your peer's work

How to give peer feedback? (Written comments on a text)

 Check the assessment criteria.

 Read the text.

 Compare the text to the assessment criteria.

 Note what your classmate has done well and explain why.

 Note what your classmate has not yet done well and explain why not.

 Formulate a suggestion for improvement for each weak point you have identified.

What constitutes good peer feedback?

- ✓ **Specific:** Comments refer to a specific aspect or part of the text.
- ✓ **Relevant:** Comments are relevant to the assessment criteria.
- ✓ **Justified:** The weaknesses and strengths of the text are named and justified.
- ✓ **Actionable suggestions:** The suggestions for improvement are formulated in such a way that your classmate knows how he/she can improve the text.
- ✓ **Honest and respectful**



Appendix D

Peer Feedback Fact Sheet

Peer-feedback – Fact sheet

What constitute good peer feedback?

- ✓ The feedback contains comments on the **strengths** and **weaknesses** of the text.
- ✓ The comments are **justified** (why is an aspect good or not good?)
- ✓ A **suggestion for improvement** is given for each weak point in the text. The suggestion is formulated in such a way that the recipient of the feedback knows how he/she can improve the text.
- ✓ The comments refer to a **specific** aspect of the text.
- ✓ The comments are relevant for the **assessment criteria**.
- ✓ The feedback is **honest and respectful**.



Appendix E

Peer Feedback Form

Feedback form for peer-feedback (Argumentative essay)

Task:

Give your classmate feedback on his/her argumentative essay in the form of written comments. Formulate the comments based on the assessment criteria for an argumentative essay.

Strengths of the text

Indicate the strengths of the text. (What has the author of the argumentative essay done well and why?)

[illegible]

Weaknesses and suggestions for improvement

Indicate the weaknesses of the text and make concrete suggestions for improvement. (What has the author of the argumentative essay not done well and why not? How could it be improved?)

[illegible]

Appendix F

Coding Scheme Peer Feedback Quality

Criterion	0 points	1 point	2 points	3 points
Reference to assessment criteria	No positive or negative remark is provided for any of the assessment criteria.	A positive and/ or negative remark is provided for some of the assessment criteria.	A positive and/or negative remark is provided for most of the assessment criteria.	A positive and/or negative remark is provided for all of the assessment criteria.
Presence of explanation / justification	None of the remarks include an explanation.	Some of the remarks include an explanation.	Most of the remarks include an explanation.	All of the remarks include an explanation.
Presence of suggestion for improvement	For none of the negative remarks a concrete suggestion for improvement is provided.	For some of the negative remarks a concrete suggestion for improvement is provided.	For most of the negative remarks a concrete suggestion for improvement is provided.	For all of the negative remarks a concrete suggestion for improvement is provided.
Specificity	None of the remarks refer to a specific behaviour or aspect of the reviewed essay.	Some of the remarks refer to a specific behaviour or aspect of the reviewed essay.	Most of the remarks refer to a specific behaviour or aspect of the reviewed essay.	All of the remarks refer to a specific behaviour or aspect of the reviewed essay.
Constructive language	None of the remarks is formulated constructively in a polite, professional, and respectful tone.	Some of the remarks are formulated constructively in a polite, professional, and respectful tone.	Most of the remarks are formulated constructively in a polite, professional, and respectful tone.	All of the remarks are formulated constructively in a polite, professional, and respectful tone.

Appendix G

Interview Questions

1. How did you feel while giving peer feedback?
 - a. Can you say why you felt this way?
2. Do you think these feelings influenced you in any way when you wrote the feedback?
 - a. If yes: How did your feelings affect you and the feedback you gave?
 - b. If not: What makes you think that your feelings had no influence on you/ the feedback you gave?

Appendix H

Relation Between Background and Study Variables

Table H1

Bivariate Correlations (Kendall's tau) between Background and Study Variables

	State anxiety		Peer feedback quality	
	τ	p	τ	p
Age	-.14	.278	.01	.962
Experience with peer feedback	-.22	.087	.05	.697
Essay quality	-.04	.751	.08	.480

Table H2

Mann-Whitney U Tests for Comparing State Anxiety and Peer Feedback Quality by Gender and Grade

Variable	Group	n	State anxiety			Peer feedback quality		
			<i>Mean Rank</i>	z	p	<i>Mean Rank</i>	z	p
Gender	Female	22	25.86	0.41	.681	29.27	1.92	.055
	Male	27	24.30			21.51		
Grade	Grade 9	24	28.63	-1.56	.118	24.19	0.62	.534
	Grade 10	26	22.62			26.71		

Appendix I

Interview Coding Scheme

Topic	Code	Example quotation	Frequency
Feelings	Neutral	“I wasn't nervous or anything. Just completely neutral.”	6
	Positive		
	Joyful	“It was actually fun”	1
	Relaxed	“I was actually quite calm”	2
	Content	“I actually felt quite good because I could help the other person”	3
	Negative		
	Bored	“It was just a bit boring”	1
	Nervous	“I was a bit nervous”	6
	Worried	“Fear of somehow writing the wrong thing, giving the wrong feedback”	3
Reasons for neutral feelings	Knowing each other	“Well, we all know each other”	1
	Prior experience with peer feedback	“We have done this at school before”	2
Reasons for positive feelings	Helping classmate	“Because I knew that I might be helping the other person”	3
	Benefit for oneself	“It was also another help for me, to see what I could improve”	1
	Prior experience with peer feedback	“We have already done this in the lesson before and we have also given feedback several times since the fifth grade”	2
Reasons for anxiety-related feelings	Peers' reaction to feedback	“If I write something that he does not see that way, it might hurt or offend him”	4
	Being wrong	“Fear of somehow writing the wrong thing, giving the wrong feedback”	2

	Participation in study	“Because it's a study and not just something that normally happens in class.”	2
Influence of anxiety-related feelings	Formulation of feedback	“I wanted to try to put it in a way that didn't sound so mean. So, I wrote down all the things that I didn't like in the text, just in a friendlier way”	2
	Tendency to give positive feedback	“So usually when you give feedback, you tend to say negative things. But I've now said about the same amount of good and negative things. So, I tried to keep that in balance.”	2
	No influence	“I just judged it the way I saw it, regardless of whether I was nervous or not”	4

Note. Quotes were translated from German.

Appendix J

Use of Artificial Intelligence (AI)

During the preparation of this work, the author occasionally used the AI writing tool *DeepL Write* in order to receive suggestions for context-sensitive synonyms and alternative phrasing of sentences. In addition, *Google Docs* was used to check and correct grammar and spelling. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.