

**Effect of peer feedback role: task performance, feedback implementation and perceptions
on learning and trust.**

David Zamorano¹; Ernesto Panadero^{2,3,1}; Maryam Alqassab⁴; Alejandro Amillano¹

¹ Education Regulated Learning and Assessment group (ERLA group), Faculty of Education and Sport, Universidad de Deusto, Bilbao, Spain

² Centre for Assessment Research Policy and Practice in Education, School of Policy & Practice, Institute of Education, Dublin City University, Ireland.

³ IKERBASQUE, Basque Foundation for Science, Bilbao, Spain.

⁴ Department of Online Learning and Instruction, Faculty of Educational Sciences, Open University, Netherlands.

Author note:

David Zamorano  <https://orcid.org/0000-0002-3291-6983>

Ernesto Panadero  <https://orcid.org/0000-0003-0859-3616>

Maryam Alqassab  <https://orcid.org/0000-0002-6574-5113>

Alejandro Amillano  <https://orcid.org/0000-0003-1099-7724>

Recommended citation: Zamorano, D., Panadero, E., Alqassab, M., & Amillano, A. (2025). Effect of Peer Feedback Role: Task Performance, Feedback Implementation and Perceptions on Learning and Trust. *The Journal of Experimental Education*, 1–25. <https://doi.org/10.1080/00220973.2025.2466146>

This is a post-peer-review, pre-copyedit version of an article published in The Journal of Experimental Education. The final authenticated version is available online at: <https://doi.org/10.1080/00220973.2025.2466146>. This manuscript may not exactly replicate the published version due to editorial changes and/or formatting and corrections during the final stage of publication. Interested readers are advised to consult the published version.

Spanish Ministry of Economy and Competitiveness (Ministerio de Economía y Competitividad) National I+D Call (Convocatoria Excelencia) project reference EDU2016-79714-P; personal grant (Formación de Personal Investigador) reference PRE2020-092280; and Basque

Government Call for Grants to support the activities of research groups of the Basque University System (2022-2025) project reference IT1624-22.

Correspondence concerning this manuscript should be addressed to: David Zamorano Sande, ERLA office, Universidad de Deusto, Bilbao, 48007. Spain. E-mail: david.zamorano@deusto.es

Abstract

When engaged in peer feedback activities, students can act as providers and/or recipients. While some researchers have suggested that these roles might influence students' learning differently, there is still limited empirical evidence about the effect of each role on peer feedback outcomes. Our aim was to investigate the impact of the two peer feedback roles on task performance, feedback implementation, students' perceptions of learning and trust. In a counter-balanced within-subject experimental design, forty-five third-year undergraduate psychology students worked on a cover letter analysis task and performed both roles as provider and recipient successively. After performing each role, we measured students' task performance together with their perceptions of learning and trust. The results showed no significant effects of peer feedback roles on task performance and feedback implementation. Additionally, students perceived similar learning from providing or receiving peer feedback, and they also perceived similar trust in themselves and in their peers as providers of feedback.

Keywords: peer feedback, peer assessment, students' perceptions, trust.

Introduction

Peer feedback has been increasingly used in multiple educational settings as it has been proven beneficial for students' learning and task performance (Double et al., 2020; Li et al., 2020). Almost a decade ago, researchers highlighted a gap in the empirical evidence on the differential impacts of providing and receiving peer feedback on students' learning (Topping, 2010; van Zundert et al., 2010). Accordingly, studies began to systematically explore the differential effects of providing and receiving peer feedback, focusing mainly on three outcome variables: task performance (Huisman et al., 2018; Lundstrom & Baker, 2009), feedback implementation (Wu & Schunn, 2020, 2023) and perceptions such as perception of learning and trust (Ion et al., 2019; Martin et al., 2021). However, the studies are still scarce and findings sometimes mixed, leading to inconclusive results. Additionally, (quasi) experimental studies examining the impact of peer feedback roles on various outcomes are still limited. This is particularly relevant for deepening our understanding of the distinct benefits of providing and receiving peer feedback. Our aim is to fill in this research gap by investigating how peer feedback roles (providing vs. receiving) influence different outcomes, including task performance, feedback implementation, and perceptions of learning and trust.

Peer feedback: definition and roles

Peer feedback is a learning activity where individuals or small groups exchange, react to and/or act upon information about their performance on a particular learning task to accomplish, implicit or explicit, shared and individual learning goals (Alqassab et al., 2018b). In peer feedback, the students can play two roles: providers or recipients of peer feedback (Reinholz, 2016). As providers, students use their knowledge and skills to review, clarify, and correct others' work (Kim, 2009). As recipients of peer feedback, students receive feedback from their

peers that they can use to improve their task performance, their self-regulated learning, or critical thinking (Tsivitanidou & Constantinou, 2016). Although both roles are typically integral to the peer feedback process, teachers can decide if he is only interested in having students to only produce or arrange so that one produces and another receives (e.g. high achievers provide to low achievers). Additionally, even if students are engaged in both roles, teachers must be aware of the different dynamics implied in each role and how they can impact student outcomes. Therefore, understanding the differential effects roles can have on peer feedback outcomes can facilitate peer feedback dynamics, impact task performance and improve informed decisions from teachers.

More than a decade ago, experts called for a detailed study of the different learning experiences and effects of providing and receiving feedback from peers (Topping, 2010; van Zundert et al., 2010). In response to this call, some studies focused on the role of the provider (Alqassab et al., 2018a; Rotsaert et al., 2018) or the recipient (Aben et al., 2022; Van Meenen et al., 2023). A reduced group of group of studies compared both roles simultaneously, investigating their differential effects on outcomes: task performance (e.g., Huisman et al., 2018; Lundstrom & Baker, 2009), feedback implementation (e.g., Wu & Schunn, 2020, 2023), perceptions of learning (e.g., Ion et al., 2019; Martin & Sippel, 2021), and trust (Carlsson Hauff & Nilsson, 2022; Su, 2023).

Peer feedback roles and task performance

The impact of peer feedback and task performance has been a topic of interest since it is one of the driving factors behind its classroom implementation. Empirical research shows that peer feedback can have a positive impact on task performance, as evidenced by reviews and meta-analyses (Double et al., 2020; Panadero et al., 2018b; van Zundert et al., 2010; Yan et al.,

2022). However, these reviews and meta-analysis have not addressed how differently roles impact student task performance, which raised questions on whether the benefit of peer feedback might come from just one of the roles (Double et al., 2020). To our knowledge, the impact of peer feedback roles has been investigated in a limited number of studies. For instance, Lu & Law (2012) found that providing feedback on peers' work predicted the final project score, whereas receiving peer feedback was not a significant predictor. Similarly, in Li et al.'s (2010) study, the quality of the peer feedback the students provided to their peers predicted the quality of their final projects, which was not the case for the feedback received. In line with this finding Lundstrom & Baker's (2009) quasi-experimental study found that students who acted as providers outperformed on task performance those who acted as recipients. However, in another quasi-experiment, Huisman et al. (2018) found that both providers and recipients had improved task performance across all assignment elements. Thus, there is a tendency for the provider role to be the one significantly beneficial for students' task performance, however the results of the two quasi experimental studies are contradictory. This contradiction is relevant since the empirical value of this design is strengthened in contrast with others, due to their ability to disentangle the effect between roles, as they are separated per conditions. Therefore, there is a need for experimental studies to determine with more certainty whether peer feedback roles differentially impact task performance.

Peer feedback roles and feedback implementation

While it is demonstrated that peer feedback positively influences task performance, this may not always be the case, as the recipient may or may not utilize the feedback (Tooping, 1998). Similarly, when students provide feedback on peers' work, they may or not choose to decide to revise their work based on the feedback they have provided (Patchan et al., 2016; van

der Pol et al., 2008). Therefore, study feedback implementation as an outcome is relevant for evaluating the success of the peer feedback activity (Patchan et al., 2016). Feedback use has been operationalized as feedback implementation, which refers to the changes made by a student from a previous version of the task to a subsequent version of the task as a result of providing or receiving a feedback comment from/for a peer (Wu & Schunn, 2020).

Although research has begun to explore the connection between feedback and its implementation, the specific roles of providers and recipients have not been sufficiently contrasted to determine which is more effective in promoting feedback implementation. Addressing this gap has significant practical implications. If research were to reveal that students are more likely to implement feedback after providing it, educators could design peer feedback activities that emphasize the provider role, such as having students provide feedback on fictional peers' work before engaging in actual peer feedback. As far as we know, two studies Wu & Schunn (2020, 2023) investigated how feedback role was associated with implementation. While in one study they found that only receiving one type of feedback was associated with implementation, in the other study, they found that both receiving explanation and providing suggestions were positively related to feedback implementation. These results are mixed, and they focus on the information provided and received and not on the engagement of students on the roles. Therefore, it is still unclear whether students will implement more feedback after acting as providers or as recipients.

Peer feedback roles and students' perceptions of learning and trust

Although the literature has focused on the effect of peer feedback on learning related outcomes, like task performance and feedback implementation, in the last decades, there has been a growing recognition of peer feedback influences on intrapersonal and interpersonal

factors. This intra-interpersonal factors include, amongst others, perceptions of learning and trust in the self and peer as providers of feedback (van Gennip et al., 2009). Since peer feedback is inherently a social activity, understanding these factors is crucial for creating a safe environment, as they significantly shape the peer feedback process and the outcomes for both providers and recipients (Müller et al., 2016; Panadero et al., 2023). However, recent studies have called the attention that the peer feedback roles might have differential effects on the above-mentioned variables: students' perceptions of learning (Ion et al., 2019; Martin et al., 2021; Mulder et al., 2014) and trust (Carlsson Hauff & Nilsson, 2022; Su, 2023).

Perceptions of learning are a set of beliefs and feelings a student has regarding the learning that has occurred from peer feedback (Caspi & Blau, 2008). Perceptions of learning are fundamental because, although they might not reflect actual learning from peer feedback (Noroozi et al., 2024), they can influence students' motivation to engage in a specific learning activity and, consequently, their learning outcomes (Bandura, 1978; Jones et al., 2010). In this line, the researcher has been seeking to identify which role -provider or recipient- leads to greater perceptions of learning, given its predictive on student's involvement on peer feedback. The findings in this area are somewhat mixed, with some studies suggesting that students find the provider role to be the one more enriching for their learning (Ion et al., 2019b; Li & Grion, 2019; Martin et al., 2021) while others indicate that both roles positively impacted their learning (Cao et al., 2019; Ertmer et al., 2007; Nicol et al., 2014). These findings suggest that, when a roles is preferred, it tends to be the provider role. However, the inconsistency in results across studies suggests that this conclusion is tentative and needs to be further explored.

Beyond perceptions of learning, perceptions of trust in self and peers as providers of feedback have also been alleged to differ. Trust in oneself as a provider is the "belief in the

ability to provide peer feedback”, while trust in the peer is defined as the “confidence in a peer’s capability to perform a fair and/or accurate peer feedback” (Panadero et al., 2023, p.5). Both trust in oneself and in others as feedback providers influence students' engagement in peer feedback (Zou et al., 2018) and are associated with a higher perceived educational value of the process (Rotsaert et al., 2017), thereby shaping how students respond to and implement feedback (Carless, 2012; Cheng & Tsai, 2012). A recent study by Zhan (2024) revealed that, when receiving peer feedback, students perceived great distrust from peers as providers of peer feedback. This suggests that trust may have a more significant moderating effect on students' experiences as recipients than as providers. However, this hypothesis needs to be further tested to confirm this difference between roles, as this comparison has not been further addressed directly.

In summary, existing evidence demonstrates the impact of peer feedback roles on task performance, feedback implementation, and students' perceptions of learning and trust. However, there are mixed results and limited research on some variables that leave substantive gaps in the literature to be studied. Additionally, there is a key limitation common across the vast majority of the mentioned studies: their inability to effectively isolate the distinct roles of feedback provider and recipient. While the differences between these roles are often the focus, some studies do not directly manipulate these roles, instead relying on statistical methods such as correlations and regressions to identify predictors (Cao et al., 2019; Li et al., 2010; Lu & Law, 2012; Wu & Schunn, 2020, 2023). This reliance limits the generalizability of the findings, as predictors can vary between studies, and correlations do not establish causality (Montero & León, 2007). Consequently, there is a clear need for more experimental studies to more robust causal inferences about the specific effects of each role, which would be crucial for translating these findings into practical classroom applications (Brady et al., 2023).

Aim, research questions (RQ) and hypotheses

Our aim is to examine the effects of providing and receiving peer feedback on (RQ1) task performance, (RQ2) feedback implementation, (RQ3) and students' perceptions of *learning* and *trust*. Our research questions (RQ) and hypotheses (H) are as follows:

RQ1. What is the effect of peer feedback roles on task performance?

H1. Previous studies found that task performance was higher after providing peer feedback than after receiving peer feedback (Lu & Law, 2012; Lundstrom & Baker, 2009). Therefore, we hypothesized that students' task performance will be greater after they act as a provider compared to when they act as a recipient.

RQ2. What is the effect of peer feedback roles on feedback implementation?

H2. Due to the lack of previous empirical evidence, we did not formulate a hypothesis for this RQ, that will be explorative in nature.

RQ3. What is the effect of peer feedback roles on students' perceptions of learning and trust?

H3. We expect that students will perceive more learning when they provide peer feedback (Ion et al., 2019; Martin et al., 2021; Mulder et al., 2014). For trust, we hypothesize that students will perceive greater trust in themselves as providers than in their peers (Zhan, 2024).

Method**Sample**

An a priori power analysis was conducted for a mixed ANOVA using G*Power version 3.1.9.7 (Faul et al., 2007). The minimum sample size required was $N = 34$ to achieve 80% power for detecting a medium effect size at a significance criterion of $\alpha = .05$. Our sample was a convenience sample of 45 third-year psychology students from a Spanish university, 35 females and 10 males, mean age 22.28, $SD = 0.708$. The students were enrolled in the subject

"Psychology of the Groups and Associations". Prior to participation, all students sign an informed consent outlining the study's purpose and procedures.

Design

We employed a within-subject experimental design to investigate the impact of the peer feedback roles. Every participant acted as provider and recipient. To control for the potential carryover effect from the first to the second role, we counterbalanced the order in which the participants engaged each peer feedback role. Accordingly, the participants were randomly assigned to one of two conditions: acting first as provider and then recipient of peer feedback ($n_{p-r} = 21$), or vice versa ($n_{r-p} = 24$). Additionally, we employed fictional peer solution and peer feedback (detailed further in the Materials section) to control for the confounding effect of the variation in peer solutions and peer feedback quality due to participants' individual differences (Alqassab et al., 2018b; Bolzer et al., 2015).

We conducted the study over two phases. In the first phase, all participants performed a cover letter analysis task in classroom. In the second phase, in the laboratory, each student was individually provided and then received peer feedback or vice versa on the cover letter analysis task they performed in class, and then performed a new cover letter analysis task after engaging in each role. Participation in the classroom task was a course requirement, whereas the laboratory session was voluntary, for which the participants were awarded with extra course credit points. The study was approved by the Deusto University Research ethical committee with the reference ETK-19/23-24. All students signed an informed consent form approved by the ethics committee before attending the laboratory.

Materials

Task performance instrument: Cover letter analysis task

The task that the students performed was a cover letter analysis for the subject “Psychology of Groups and Associations”, in which students had to analyze the content of a cover letter for job suitability. The task, designed by the first and fourth authors (the course instructor and a subject matter expert), aimed to evaluate students' proficiency in analyzing complex information and making insightful interpretations using defined criteria for assessing job suitability. The students had to write an analysis of a fictional cover letter, which consisted of two parts. In the first part, the students identified and reported on five characteristics from the fictional cover letter: experience, technical ability, interpersonal skills, flexibility, and vocation. In the second part, the students had to infer the salary range and psychological needs activated based on the characteristics identified in the previous part. To successfully perform the task, the students had to identify the characteristics accurately, based on the cover letter; while supporting it with correct reasoning (e.g., the applicant has an advance knowledge of the technical requirements for the position because (...)). The participants performed three cover analysis tasks: the first time in class (Task 1, Appendix B) and twice in the laboratory after each peer feedback role (Task 2 and Task 3, Appendix B). The fourth author ensured that the difficulty level remained consistent across the three tasks. Although the tasks had uniform difficulty, their characteristics differed slightly to provide students with a novel task to work on each time (see Appendix B).

Fictional peer solution and peer feedback

To isolate the effects of peer feedback roles, a fictional peer solution for Task 1 was provided to students when in the provider role, and a fictional peer feedback on the same task was given to when in the recipient role. This approach aimed to eliminate variability in peer solution quality or feedback received. To closely mirror a real-world scenario, all participants

received the same fictional peer solution but individualized fictional feedback based on their Task 1 response. Students were informed that both the peer solution and feedback were from an anonymous classmate.

Fictional peer solution. Following Alqassab et al. (2018a), the quality of the answers in the fictional peer solution was balanced to resemble a solution of an average student. The created peer solution included (1) an answer where the characteristic was identified but no reasoning was provided, (2) answers where the characteristic was identified but with incorrect reasoning and (3) identification of the correct answer with correct reasoning. Appendix C shows the fictional peer solution used.

Fictional peer feedback. To control for feedback characteristics while simulating a realistic peer feedback experience, the feedback was standardized using a scheme yet tailored to each student's Task 1 solution. The standardization scheme, based on Strijbos et al. (2010) and detailed in Appendix C, incorporated Concise General Feedback (CGF) and Elaborated Specific Feedback (ESF). Two misleading statements were included to further mimic real peer feedback. This approach resulted in a sequence of seven feedback statements per characteristic: first, CGF; second, ESF (misleading); third, CGF; and so forth, concluding with a seventh, misleading CGF.

Instruments

Rubric for cover letter analysis task

A rubric, developed by the first and fourth authors, was used to score the cover letter analysis tasks (see Appendix A). Each criterion in the rubric was rated on a scale from 0 (lowest) to 4 (highest), and scores were averaged to obtain the final score that ranged from 0 (lowest) to 4 (highest). To ensure reliability, the first and fourth authors independently scored seven (15%) randomly selected students' solutions. If acceptable inter-rater agreement was not initially

reached, discrepancies were discussed, and the scoring process was repeated with another randomly selected 15% until an acceptable inter-rater agreement was achieved. Cohen's Kappa (κ) was used to test inter-rater reliability (McHugh, 2012). This process was conducted repeatedly for the scoring of the three cover letter analysis tasks: Task 1 ($\kappa = .209$, first round; $\kappa = .831$, second round); Task 2 ($\kappa = .672$, first round; $\kappa = .805$, second round); and Task 3 ($\kappa = .840$). The rating resulting from the sum of the scores of each criterion was used to produce a measure of task performance.

Feedback implementation

This variable was composed of two measures that were analyzed independently: (1) actual feedback implementation and (2) perceived feedback implementation.

Actual feedback implementation. We adopted Wu & Schunn's (2020) approach to quantify feedback implementation. Implementation was identified when a student modified their approach in a subsequent task, influenced by feedback either provided or received in their previous role. This involved comparing student performance in consecutive tasks (Task 1 with Task 2 and Task 2 with Task 3) and then tracing these changes to the content of the peer feedback provided or received before this task. Since the task required identifying seven items, changes corresponding to peer feedback for each item were coded as "implemented". In contrast those that did not align with the peer feedback were marked as "not implemented". Therefore, the feedback implementation score could range from zero to eight: seven points for implementing feedback on each task item, plus an additional point if the student implemented feedback related to coherence or grammar. The first and fourth authors independently coded the peer feedback implementation of seven (15%) randomly selected student's answers. If an acceptable agreement was not reached, disagreements were discussed, and the process was repeated with another seven

pieces of work randomly selected until reaching an acceptable agreement. This process was conducted separately for the two tasks performed in the lab: Task 2 ($\kappa = 0.874$, second round) and Task 3 ($\kappa = 0.884$, first round).

Perceived feedback implementation. Following Wichmann et al. (2018), after completing Tasks 2 and 3, students were asked to discuss the peer feedback provided or received in their prior role that they implemented in the new task. Their responses were audio-recorded and later transcribed. Following the process of perceived feedback implementation, the score could range from zero to eight. This score was determined based on the students' perception of whether they had implemented the feedback for any of the seven items or aspects related to coherence or grammar. To verify the reliability of perceived feedback implementation, the first and fourth authors independently coded a random 15% of these transcriptions. This reliability check was separately performed for Task 2 ($\kappa = 0.937$ second round) and Task 3 ($\kappa = 0.937$ second round).

Questionnaires

The internal structure and reliability of the scales were evaluated using parallel analysis (O'Connor, 2000), followed by multiple principal component analysis and the computation of Cronbach's alpha (Field, 2009). A detailed account of these procedures, including the modifications made to the original scales, is provided in Complementary Material 1. Below, we present the details of the scales as they were used after the modifications based on the assessment of internal structure and reliability. For each of the three questionnaires, the mean scores of the sub-scales were computed for our analyses.

Beliefs about Peer Feedback Questionnaire (BPFQ; Huisman et al., 2020). We used this measure to explore previous beliefs about peer feedback and assess if the previous beliefs on

peer feedback were balanced per condition, as it is an indicator of the degree of engagement they would have towards peer feedback (Martin & Sippel, 2022). This instrument has eight items, organized around three sub-scales, answered in a 1 “Completely not applicable to me” to 7 “Completely applicable to me” Likert scale. The sub-scales were: Valuation of Peer Feedback as an Instructional Method (VIM; *“Involving students in feedback through the use of peer feedback is meaningful”*), Confidence in Own Peer Feedback quality (CO; *“In general, I am confident that the peer feedback I provide to other students is of good quality”*) and Valuation of Peer Feedback as an important Skill (VPS; *“Being capable of dealing with critical peer feedback is an important skill”*).

Peer Feedback Provision Questionnaire (PFPQ; Alqassab et al. (2018b, 2019) measures students’ perceptions of learning and trust in self as feedback provider. The instrument has thirty-one items, organized around two sub-scales, answered in a 1 “Strongly disagree” to 7 “Strongly agree” Likert scale. The sub-scales were Learning Providing Peer Feedback (LPF, *“Providing peer feedback motivates me to modify my own work”*) and Trust Providing Peer Feedback (TPF, *“I believe that I have the competence to provide clear peer feedback.”*)

Peer Feedback Receiving Questionnaire (PFRQ). Created ad hoc to mirror the PFPQ, measuring students’ perceptions of learning and trust in others when acting as recipient. The instrument has thirty-one items, organized around two sub-scales, answered in a 1 “Strongly disagree” to 7 “Strongly agree” Likert scale. The two sub-scales were Learning receiving peer feedback (LRF, e.g. *“Receiving peer feedback that identifies mistakes in my work helps me better understand the topic”*) and Trust receiving peer feedback (TRF, e.g. *“I feel confident when receiving positive feedback from my peers”*).

Table 1 summarizes the reliability indexes of the three self-report instruments we used. All of them demonstrated strong reliability (Cronbach's $\alpha=0.7-0.8$; Field, 2009),

Table 1

Instrument used, sub-scales and reliability.

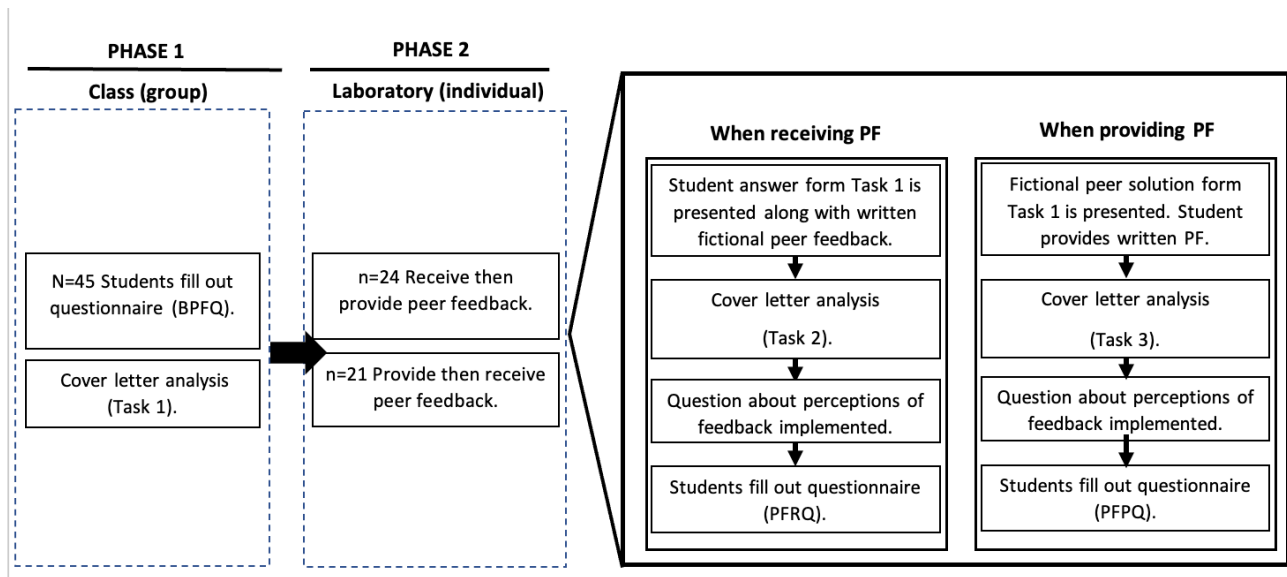
Instrument	Sub-scales	N items	<i>Cronbach's α</i>
BPFQ	VIM	3	.791
	CO	2	.766
	VPS	2	.903
PFPQ	LPF	18	.942
	TPF	13	.940
PFRQ	LRF	18	.948
	TRF	13	.922

Notes. VIM: Valuation of Peer Feedback as an Instructional Method; CO: Confidence in Own Peer Feedback Quality; VPS: Valuation of Peer Feedback as an Important Skill; LPF: Learning Providing Peer Feedback; TPF: Trust Providing Peer Feedback; LRF Learning Receiving Peer Feedback; TRF: Trust Receiving Peer Feedback.

Procedure

Figure 2

Detailed illustration of the study procedure



The experiment consisted of two phases, as illustrated in Figure 2.

In the first phase, during a three-hour classroom session, the teacher introduced the typical content of a cover letter and how to interpret it to assess its suitability for a given position. Then, the students analyzed cover letters with the teacher. At the end of the session, the students filled out the Beliefs about Peer Feedback Questionnaire (BPFQ) and analyzed a cover letter individually (Task 1, Figure 2) without the teacher's guidance.

During the second phase of the experiment, students individually attended the laboratory. Initially, they were briefed about providing and receiving feedback on their work on Task 1, with the sequence of roles based on their assigned condition. The second phase lasted four weeks. For those assigned to the provide-receive condition, the fictional peer solution of Task 1, along with a text editor to provide feedback, was presented on the screen, and the students had to provide written peer feedback on that solution, following which the student had to perform Task 2. Then, the students were asked which of the comments they provided on their peer's work they had also implemented when performing Task 2, recording their response in audio. Afterward, participants

completed the Peer Feedback Provision Questionnaire (PFPQ) before receiving peer feedback in the second part. In this phase, students processed fictional peer feedback on their Task 1 solution, followed by performing Task 3. Then they were asked which of the feedback comments received from their peer they have implemented while performing Task 3 and filled out the Peer Feedback Reception Questionnaire (PFRQ). The procedure was conducted identically in a reversed order for those in the receive-provide condition. The lab sessions lasted around 90 minutes on average. For more information on the peer feedback instructional design, see Complementary Material 2.

Data analysis

Data screening

To assess the distribution of the data, we analyzed the standardized skewness and kurtosis, Shapiro-Wilks test of normality and univariate outliers. The values that fell outside the Skewness and Kurtosis acceptable range of ± 3 , as determined by Tabachnick & Fidell (2013), were: perceived feedback implementation time 1 ($Sk = 3.06$), and actual feedback implementation time 2 ($Sk = 3.06$). For the BPFQ, two sub-scales, VPS ($Sk = -3.63$) and LRF ($Sk = -3.48$) were also negatively skewed. Moreover, a couple of variables were not normally distributed based on the Shapiro-Wilks test of normality: performance on Task 1 and Task 3 ($D(45) = 0.967, p > .225$; $D(45) = .934, p > .013$ respectively), two sub-scales of the PFPQ scale, TPF ($D(45) = -2.44, p > .016$) and LPF ($D(45) = -2.79, p > .016$), and one sub-scale of the PFRQ, TRF ($D(45) = -2.72, p > .016$). Outliers were identified by computing z values; only one outlier was identified with a value of $z > |3.29|$ (Field, 2009) for the LRF sub-scale of the PFRQ sub-scale ($z = -3.50$). The original value was checked, and no reason was found to exclude this outlier. Since most variables did not meet the assumption of normal distribution, we used robust statistical tests, Generalized Linear Mixed Models (GLMMs) and non-parametric tests to analyze the data.

Plan of analysis

To examine the impact of peer feedback role (provider vs. recipient) on task performance, feedback implementation and students' perceptions of learning and trust while accounting for the order of the roles, we used GLMMs as they offer a robust approach to analyze non-normally distributed data (Bolker et al., 2009). These models allow for testing both fixed effects (variables that are of primary interest in a study) and random effects (variables that account for how fixed effects can vary across different levels of clustering or grouping, such as participants in within-subjects designs) (Brown, 2021). In our study, the role students played, and the order (provider-recipient/recipient-provider) were included as fixed effects and a random effect was included for subjects. We used the gamma distribution with the logit link function in the GLMMs for task performance, and perceptions of learning and trust because it is recommended for positively skewed continuous variables (Garson, 2014). A negative binomial with a logarithmic function was used to analyze actual feedback implementation and perceived feedback implementation because it has been reported to be more robust when the assumption of homogeneity of variance is violated (Dunn & Smyth, 2018). To establish the random effect structure, first, the maximal model that included random effects parameters for all sources of variability (participant, order and role) was fitted and progressively reduced until convergence was reached (Singmann & Kellen, 2019). This resulted in only including random intercept for participants in all of the GLMMs used in this study. The sum contrast encoding for the categorical predictor's role and condition was used in the GLMM instead of dummy encoding because sum contrast encoding produces main effects instead of simple effects (Brehm & Alday, 2022). A likelihood ratio test was used to compare the tested model to a nested model (a model with no predictors) (Brown, 2021). This was done to assess if the peer feedback role significantly

impacted task performance, feedback implementation, and perceptions of learning and trust. The fixed and random effects and the likelihood ratio test results are reported for each model (Meteyard & Davies, 2020).

Following the GLMM for RQ1, we performed a non-parametric repeated measures ANOVA (Friedman's test) as a post-hoc analysis to examine if there was an overall improvement in task performance from Task 1 to Task 2 and from Task 2 to Task 3, regardless of the condition. A Bonferroni correction was applied to account for the potential inflation of type I error due to multiple testing. We report the test statistics, p-values, and the effect size.

The GLMM were conducted in R version (4.2.2). GLMM with Gamma family and logarithmic link was conducted using the Lme4 package version 1.1-32 (Bates et al., 2015), and the negative binomial was conducted with the MASS package version 7.3-58.3 (Brian et al., 2023). The post-hoc ANOVA was conducted using JASP version (0.16).

Results

Preliminary analysis

To ensure that the equivalence of participant characteristics across conditions, we used five control variables: sex, age, prior academic performance (GPA), prior knowledge (Task 1 performance) and previous beliefs about peer feedback (measured by the Beliefs about Peer Feedback Questionnaire (BPFQ)). We performed independent sample t-tests to compare the two groups on these measures. No significant differences were observed between the two conditions across these variables (see Table 2).

Table 2

T-test results of control variables

	Measure	<i>t</i> (45)	<i>p</i>
Sex		.224	.824

BPFQ	Age	.361	.720
	GPA	1.36	.179
	Task 1 performance	.935	.355
	VIM	-1.109	.274
	CO	.739	.464
	VPS	0.085	.933

Notes. BPFQ; Beliefs of peer feedback questionnaire; VIM; Valuation of peer feedback as an instructional method; CO: Confidence in own peer feedback quality; VPS: Valuation of peer feedback as an important skill.

RQ1. Peer feedback roles effect on task performance

According to a GLMM with peer feedback role, order, and task performance as fixed factors - and a random intercept for participants, neither role ($\beta = -0.01, p = .240$) nor order ($\beta = 0.00, p = .900$) significantly predicted task performance $\chi^2(4) = 6.28, p = 0.170$ (see Table 3). Students' task performance did not significantly differ whether they performed the task after providing peer feedback ($M_{p-r} = 2.40, SD_{p-r} = 0.917; M_{r-p} = 2.52; SD_{r-p} = 0.874$) or after receiving peer feedback ($M_{p-r} = 2.46, SD_{p-r} = 0.932; M_{r-p} = 2.52; SD_{r-p} = 0.874$), regardless of the order in which they played these roles (see Figure 3; Table 3).

Table 3

GLMM model predicting task performance as a function of peer feedback role

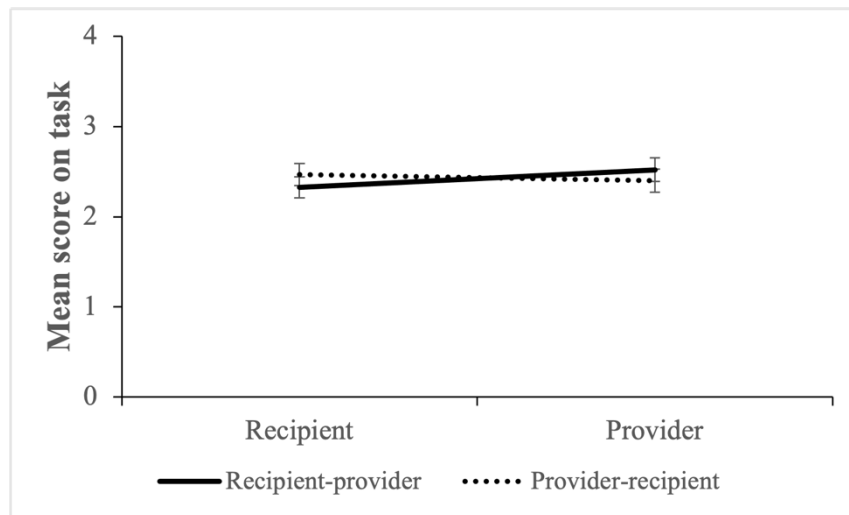
Predictors	Fixed Effects			
	Std β	95% CI	<i>t</i>	<i>p</i>
Intercept	3.10	1.01 - 0.22	3.00	.002**
Role	-1.00	0.00 - -0.02	-1.17	.240
Order	0.00	0.05 - -0.05	-0.12	.900
Task performance	1.38	0.26 - -0.04	1.35	.176
Interaction				
Role x Order	-2.00	-0.00 - -0.03	-1.70	.088
Subject (Intercept)	Random effects			
	Variance		SD	
	0.02		0.15	
Model fit: Likelihood-ratio test.				
	χ^2	df		<i>p</i>

“Nested model” vs. model 6.28 4 .179

Note. Model equation: Subsequent task performance ~ as factor (Role)*as factor (Order) + Pre-test performance + (1|CODE); Significant codes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3

Marginal means of task performance on cover letter analysis from the first peer feedback role to the second role

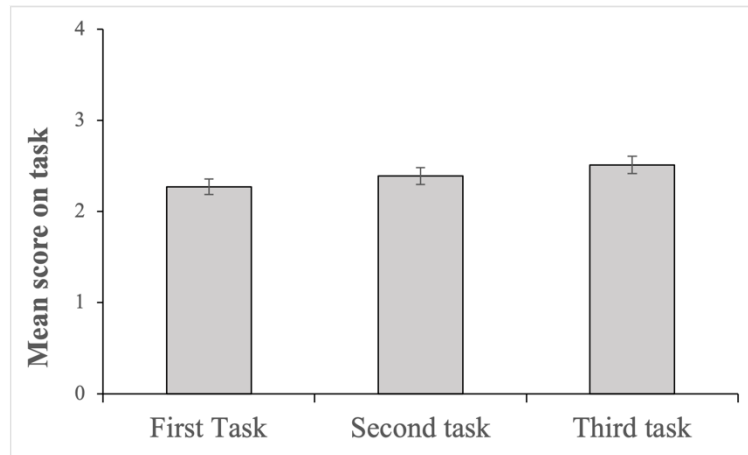


Note. Error bars are standard errors of means.

A post-hoc analysis, was conducted to determine whether there was an overall increase in performance from Task 1 to Task 2 and from Task 2 to Task 3. No significant differences were found from Task 1 to Task 2 ($t(45) = 1.496, p = .142, d = .223$) and from Task 2 to Task 3 ($t(45) = 1.275, p = .209, d = .190$), indicating that students’ task performance did not change significantly as they worked on the task three times Task 1 ($M = 2.27; SD = 0.395$), Task 2 ($M = 2.39; SD = 0.582$) and Task 3 ($M = 2.51; SD = 0.478$) (see Figure 9). The students' average scores were slightly above two, which is the midpoint on a scale ranging from zero to four.

Figure 9

Mean task performance of the three-cover letter Tasks (Task 1, Task 2, and Task 3).



Note. Error bars are standard errors of means.

RQ2. Peer feedback roles effect on actual and perceived feedback implementation

According to the GLMM with role and order as fixed factors and a random intercept for participants, there was a significant main effect of role ($\beta = 0.26, p = .048$) but no significant main effect of order ($\beta = -0.80, p = .418$) on peer feedback implementation. Yet, we found a cross-over interaction effect ($\beta = 0.34, \chi^2(3) = -10.13, p = 0.01$, see Table 4 & Figure 4). The interaction effect suggests that the role's effect on feedback implementation differed depending on the order in which the participants performed each role. When students acted as providers first ($M_{p-r} = 0.33; SD_{p-r} = 0.704$), they made less feedback implementation than when acted as recipients later ($M_{p-r} = 1.14; SD_{p-r} = 1.29$), and when they acted as recipients first ($M_{r-p} = 0.708; SD_{r-p} = 0.957$), they made less feedback implementation than when they acted as providers later ($M_{r-p} = 0.833; SD_{r-p} = 1.03$). These findings indicate that the students implemented more feedback after the second role they played, regardless if it was a provider or a recipient (see Figure 4). It is essential to stress that, although these differences are significant, they are trivial as participants performed low levels of feedback implementation in this study.

Table 4

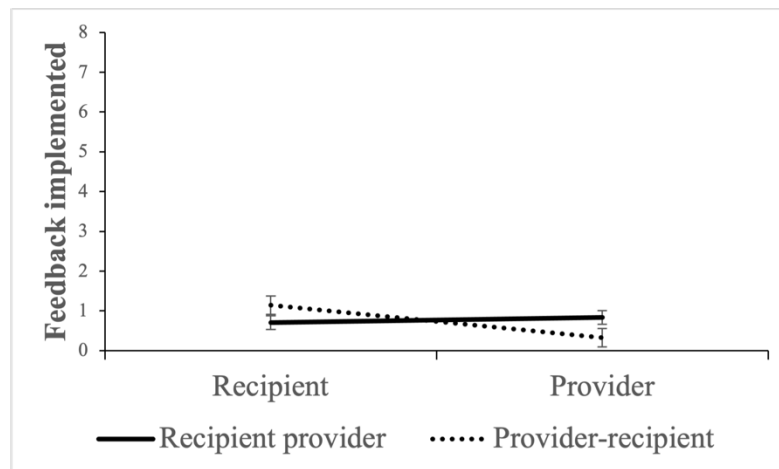
GLMM model predicting feedback implementation as a function of peer feedback role

	Fixed Effects			
	Std β	95% CI	<i>t</i>	<i>p</i>
Predictors				
Intercept	-2.76	-0.11- -0.64	-2.75	.005**
Role	1.97	0.53- 0.00	1.97	.048*
Order	-0.80	0.16- -0.37	-0.80	.418
Interaction				
Role x Order	2.57	0.61- 0.08	2.57	.010
Random effects				
	Variance		<i>SD</i>	
Subject (Intercept)	.000		.000	
Model fit: Likelihood-ratio test.				
	X^2	df	<i>p</i>	
“Nested model” vs model	-10.13	3	.010 **	

Note. Model equation: feedback implementation ~as factor (Role)*as factor (Order) +(1 | CODE); Significant codes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 4

Marginal means of feedback implementations after the first peer feedback role and after the second role.



Note. Error bars are standard errors of means.

A GLMM with role and order as fixed factors and a random intercept for participants, revealed that there were no significant main ($\beta = 0.12, p = .202$; $\beta = -0.80, p = .418$) or interaction effects ($\beta = 2.57, p = .010$) for role and order on perceived peer feedback implementation (Table 5 & Figure 5). The likelihood ratio test indicated that a nested model

without the predictors provided a better fit for the data, $\chi^2(3) = -2.77, p = .200$. When students acted as providers ($M_{p-r} = 1.33; SD_{p-r} = 1.31; M_{r-p} = 2.52; SD_{r-p} = 0.874$), they reported similar perceived feedback implementation to when they acted as recipients ($M_{p-r} = 0.261; SD_{p-r} = 1.36; M_{r-p} = 1.50; SD_{r-p} = 1.30$; see Figure 5).

Table 5

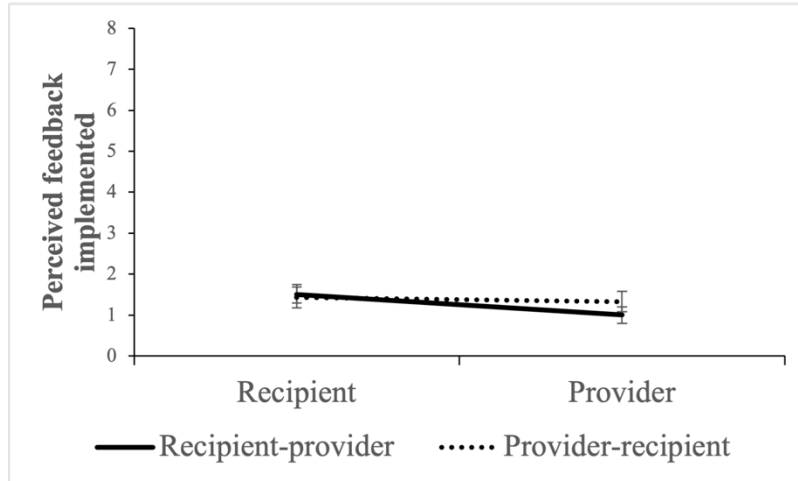
GLMM models predicting perceived peer feedback implementation

Fixed Effects				
	Std β	95% CI	<i>t</i>	<i>p</i>
Predictors				
Intercept	-0.28	0.44 – 0.08	2.82	.000***
Role	0.12	0.30 - -0.06	1.27	.202
Order	-0.06	0.24 - -0.12	0.64	.520
Interaction				
Role x Order	0.09	0.10 - -0.27	-0.90	.365
Random effects				
	Variance		SD	
Subject (Intercept)	0.000		0.000	
Model fit: Likelihood-ratio test				
	χ^2	<i>df</i>	<i>p</i>	
“Nested model” vs model	2.77	2	.249	

Note. Model equation: Perceived feedback implemented~ as factor (Role)*as factor (Order) +(1 | CODE); Significant codes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 5

Marginal means of perceived peer feedback implementation in the first peer feedback role and in the second role.



Note. Error bars are standard errors of means.

RQ3. Peer feedback roles effect on students’ perceptions of peer feedback (*learning and trust*)

Initially, perceptions of learning and trust were included in the same model as they are theoretically related variables measured by the same scale. However, this model failed to converge. Then, we simplified the model, separating it into two models (Bolker, 2013).

According to a GLMM with role and order as fixed factors and a random intercept for participants, there were no significant effects on perceived learning (see Table 6). Likelihood-ratio test indicated that the model without learning provided a better fit for the data than a model with the predictors, $\chi^2(3) = 4.42, p = .210$ (see Figure 6). When students acted as providers ($M_{p-r} = 5.70, SD_{p-r} = 1.23; M_{r-p} = 5.84; SD_{r-p} = 1.17$) their reported perceptions of learning were similar to when they acted as recipients ($M_{p-r} = 5.69; SD_{p-r} = 1.23; M_{r-p} = 5.62; SD_{r-p} = 1.12$;(see Figure 6).

Table 6

GLMM model predicting perceptions of learning.

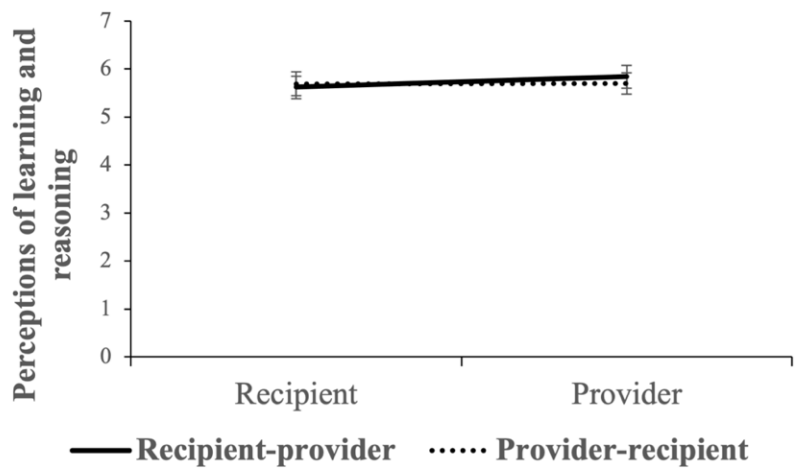
Predictors	Fixed Effects			
	Std β	95% CI	<i>t</i>	<i>p</i>

Intercept	87.00	1.78 – 1.70	60.26	.000 ***
Role	0.00	0.02 – 0.00	1.50	.132
Order	0.00	0.04 - -0.04	-0.10	.916
Interaction				
Role x Order	0.00	0.00 - -0.02	-1.44	.150
Random effects				
	Variance		SD	
Subject (Intercept)	0.01		0.10	
Model fit: Likelihood-ratio test.				
	X^2	df	p	
“Nested model” vs model	4.42	3	.218	

Note. Significant codes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 6

Marginal means of perceptions of learning in the first peer feedback role and in the second role.



Note. Error bars are standard errors of means.

A GLMM with role and order as fixed factors and subject as random factor showed that peer feedback role significantly predicted perceptions of trust ($\beta = 0.05, p = .000$) (Table 7). A likelihood-ratio test indicated that the model including trust provided a better fit for the data than a model without $\chi^2(3) = 17.39, p = .000$. However, although the GLMM revealed a significant effect, the β coefficient was very small indicating this difference is trivial. This is even more noticeable, when examining the marginal means graphs, as they suggest that the means of trust

when they acted as providers ($M_{p-r} = 4.94, SD_{p-r} = 1.60; M_{r-p} = 5.20; SD_{r-p} = 1.57$) and recipient ($M_{p-r} = 4.46; SD_{p-r} = 1.45; M_{r-p} = 4.53; SD_{r-p} = 1.38$; see Figure 7), are similar.

Table 7

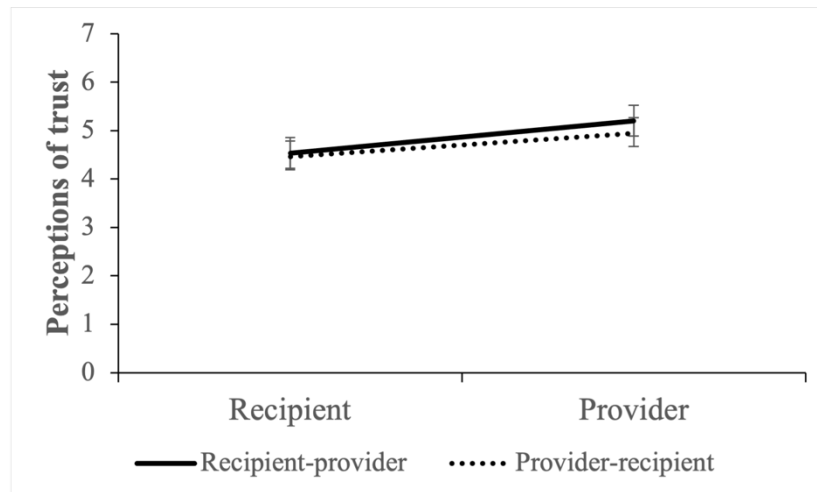
GLMM model predicting perceptions of trust as a function of peer feedback role.

	Fixed Effects			
	<i>Std β</i>	95% CI	<i>t</i>	<i>p</i>
Predictor				
Intercept	39.00	1.64 – 1.48	36.74	.000 ***
Role	5.00	0.07 – 0.03	4.35	.000 ***
Order	-0.25	0.07 - -0.09	0.39	.692
Interaction				
Role x Order	0.00	0.02 - -0.02	-0.62	.529
Random effects				
	Variance		<i>SD</i>	
Subject (Intercept)	0.02		0.15	
Model fit: Likelihood-ratio test.				
	<i>X</i> ²	<i>df</i>	<i>p</i>	
“Nested model” vs. model	17.39	3	.000 ***	

Note. Significant codes: * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 7

Marginal means of perceptions of trust in the first peer feedback role and the second role.



Note. Error bars are standard errors of means.

Discussion

This study investigated whether peer feedback roles (provider vs. recipient) influenced students' task performance, feedback implementation and perceptions of learning and trust.

Effect of peer feedback roles on task performance

In response to RQ1, our results showed no significant differences in task performance, thus not supporting H1. Contrary to the findings of Lundstrom & Baker (2009), Lu & Law (2012) and Li et al. (2010), we did not find that when students engaged in the provider role they demonstrated higher task performance compared to when they acted as recipients. Nevertheless, our results align with Huisman et al. (2018), who found no significant effect of peer feedback role on task performance. Yet, for Huisman et al. (2018), task performance improved significantly for students acting both roles. Our posthoc analyses showed that this was not the case in our study as we did not observe a significant improvement in students' performances from the first to the second or to second to the third task. One possible explanation for the not significant improvement of task performance could be the complexity of the cover letter analysis task which required students to analyze information based on specific criteria and make interpretations based on this information (See Task 1, 2 and 3 in Appendix B). This can also explain why the scores of the students in all time points are just above the average score. This finding supports prior research showing that using complex tasks with peer feedback is cognitively demanding and can interfere with learning (van Zundert et al., 2012).

Effect of peer feedback roles on feedback implementation

The RQ2, examined the impact of peer feedback roles on feedback implementation, divided into two; actual and perceived feedback implementation. The results revealed no significant differences in feedback implementation when students acted as providers or recipients. However, a significant interaction effect indicated that students implemented more

feedback during the second role they engage, probably because of the accumulated effect from the first role. This was only found for the actual feedback implementation and not for the perceived feedback implementations. Our findings contrast with those of Wu and Schunn (2020), who identified receiving feedback as a predictor of the quantity of feedback implemented, and with Cho & Cho (2011) who found that providers produced higher-quality revisions than recipients. In contrast, our study did not find a significant difference between the roles. One explanation for the increase in peer feedback implementation in our study might be that when closing the assessment cycle and performing the second role, the students were more able to implement those comments due to having experienced both processes of peer feedback or due to more familiarization with the task or the criteria. The students also worked on two tasks and therefore had more than one opportunity to realise issues they could improve in their task performance. In conclusion, our findings of no differences in feedback implementation between roles contribute to the scarce body of studies investigating feedback implementation accounting for both roles, adding to the mixed results (Cho & Cho, 2011; Wu & Schunn, 2020). Although challenging, we advocate that future studies interested in feedback implementation account for both roles, as subsequent information implementation, is one of peer feedback's primary goals (Strijbos et al., 2010). Therefore, the aim forward should be to deepen into the variables that mediate the feedback implementation for both providers and recipients simultaneously, like the characteristics of information received, as Wu & Schunn (2020, 2023) pushed in recent efforts.

Effect of peer feedback roles on students' perceptions of learning and trust.

In RQ3, we investigated the effect of peer feedback role on students' perceptions of learning and trust. Our results indicated that students perceived similar levels of learning regardless of whether they acted as providers or recipients, thus not supporting H3. Conversely,

the students perceived slightly more trust in them selves as providers than in others as provider of feedback, but this result has to be taken carefully.

The lack of differences in perceived learning aligns with the results of no significant improvement in students' task performance, and peer feedback implementation as a function of role in this study. However, these results contrasts with previous studies, where students generally perceived greater learning when acting as providers of peer feedback (Ion et al., 2019; Mulder et al., 2014). Still, according to Nicol et al. (2014), half of the students reported learning from providing and receiving. Therefore, in line with Nicol et al. (2014), students could have perceived learning from both activities with no preference for one, especially since students' perceptions of learning were overall high in our study (means around 5.8 on a 7-point scale).

Regarding perceived a similar level of trust in the self and peers as provider of feedback, we did not find robust significant difference. Despite, the difference resulted significant, closely inspecting the estimate and the marginal means suggests that the difference is trivial, thus not confirming our H4. This finding contrasts with the results of Zhan (Citation2024) which showed that students experience greater social demands, particularly distrust, toward their peers as providers of feedback. In the context of Zhan (Citation2024), such distrust could have stemmed from students' concerns about the accuracy and fairness of peer assessments, as noted by previous studies (Panadero et al., Citation2023). Our investigation of the relationship between trust and roles was prompted by the absence of prior studies that explicitly contrasted students' trust as recipients and providers after engaging in peer feedback. Consequently, future studies reexamining this contrast will facilitate drawing more robust conclusions on the differences in trust in the self and peer as peer feedback providers and contextualize the results found on this study.

Limitations and future lines of research

The first limitation of this study is that it took place in the laboratory, where students engaged in both roles under the observation of the researcher. This setting is different from a usual learning environment in which they typically engage in peer feedback activities. A second limitation is that we used a fictional peer solution and peer feedback to compare the roles of the provider and the recipient. This was necessary to control for the effect of variation of peer solution and peer feedback quality, as done in previous research (Alqassab et al., 2018b; Bolzer et al., 2015). A third limitation, is that we relied on convenient sampling to recruit our participants. Lastly, the fourth limitation is that we solely relied on outcome measures to understand the differences between peer feedback roles. However, during provision and reception, students engage in internal processes that lead to the observable outcomes of this study. Therefore, future research should combine outcome and process measures to gain a better understanding of the difference between both roles as Aben et al (2024). This will increase the understanding of the mechanism that leads to learning from provision in contrast with reception and vice versa.

Practical implications

This study offers practical implications. First, our findings suggest that neither peer feedback roles significantly impacts student's task performance, feedback implementation, and students' perceptions of learning and trust, suggesting that involving students in both roles in the classroom can be equally beneficial for student learning and task performance (Double et al., 2020; Li et al., 2020). Second, our results suggest that, in our sample, students trust themselves as providers similarly to how they trust their peers. However, as other intra-interpersonal factors have showed to be influenced by decisions on the implementation of peer feedback

(e.g. presence of anonymity) this dynamics could vary in other contexts. Given the lack of robust evidence to offer specific strategies regarding the differences between roles on perceived trust, teachers can make an initial decision by guiding students through the peer feedback process and provide opportunities for reflection on the potential tensions in provision and reception of peer feedback (Senden et al., Citation2023; Senden et al., Citation2023). In conclusion, this study adds to the existing literature comparing peer feedback roles, enhancing informed decisions when deciding whether to use one role or another in a classroom context.

Conclusion

Peer feedback is a powerful instructional and learning activity that usually involves two main roles: receiving and providing peer feedback. Previous studies have explored the differences between these two roles separately. However, a remaining gap in the literature is to explore how each role contributes differently to different students' learning outcomes. In an attempt to address this research gap, our study revealed that roles might not have different impacts on task performance, feedback implementation, perceived learning and perceived trust. Yet, these findings, along with the differential impact of roles on trust underlying different peer feedback roles are open to further research to unpack the potential impact of peer feedback roles fully.

References

- Aben, J., Mascareño, M., & Anneke, L. (2024). The impact of interpersonal perceptions on the process of dealing with errors while providing and processing peer- feedback on writing. *Instructional Science*. <https://doi.org/https://doi.org/10.1007/s11251-024-09660-0>
- Aben, J., Timmermans, A. C., Dingyloudi, F., Lara, M. M., & Strijbos, J. W. (2022). What influences students' peer-feedback uptake? Relations between error tolerance, feedback

tolerance, writing self-efficacy, perceived language skills and peer-feedback processing.

Learning and Individual Differences, 97(June). <https://doi.org/10.1016/j.lindif.2022.102175>

Alqassab, M., Strijbos, J. W., & Ufer, S. (2018a). The impact of peer solution quality on peer-feedback provision on geometry proofs: Evidence from eye-movement analysis. *Learning and Instruction*, 58(October 2017), 182–192.

<https://doi.org/10.1016/j.learninstruc.2018.07.003>

Alqassab, M., Strijbos, J. W., & Ufer, S. (2018b). Training peer-feedback skills on geometric construction tasks: role of domain knowledge and peer-feedback levels. *European Journal of Psychology of Education*, 33(1), 11–30. <https://doi.org/10.1007/s10212-017-0342-0>

Alqassab, M., Strijbos, J. W., & Ufer, S. (2019). Preservice mathematics teachers' beliefs about peer feedback, perceptions of their peer feedback message, and emotions as predictors of peer feedback accuracy and comprehension of the learning task. *Assessment and Evaluation in Higher Education*, 44(1), 139–154. <https://doi.org/10.1080/02602938.2018.1485012>

Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioral change. *Advances in Behaviour Research and Therapy*, 1(4), 139–161. [https://doi.org/10.1016/0146-6402\(78\)90002-4](https://doi.org/10.1016/0146-6402(78)90002-4)

Bates, D., Mächler, M., Bolker, B. M., & Walker, S. C. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1). <https://doi.org/10.18637/jss.v067.i01>

Bolker, B. M. (2013). Linear Mixed and Generalized Linear Mixed Models. In *Ecological Statistics: Contemporary Theory and Application*. (pp. 310–334). <https://doi.org/10.1201/9781351165761-5>

Bolker, B. M., Brooks, M. E., Clark, C. J., Geange, S. W., Poulsen, J. R., Stevens, M. H. H., &

- White, J. S. S. (2009). Generalized linear mixed models: a practical guide for ecology and evolution. *Trends in Ecology and Evolution*, 24(3), 127–135.
<https://doi.org/10.1016/j.tree.2008.10.008>
- Bolzer, M., Strijbos, J. W., & Fischer, F. (2015). Inferring mindful cognitive-processing of peer-feedback via eye-tracking: Role of feedback-characteristics, fixation-durations and transitions. *Journal of Computer Assisted Learning*, 31(5), 422–434.
<https://doi.org/10.1111/jcal.12091>
- Brady, A. C., Griffin, M. M., Lewis, A. R., Fong, C. J., & Robinson, D. H. (2023). How Scientific Is Educational Psychology Research? The Increasing Trend of Squeezing Causality and Recommendations from Non-intervention Studies. *Educational Psychology Review*, 35(1), 1–11. <https://doi.org/10.1007/s10648-023-09759-9>
- Brehm, L., & Alday, P. M. (2022). Contrast coding choices in a decade of mixed models. *Journal of Memory and Language*, 125(January), 104334.
<https://doi.org/10.1016/j.jml.2022.104334>
- Brian, A., Venables, B., Bates, D. M., Firth, D., & Ripley, M. B. (2023). *Package ‘MASS.’*
- Brown, V. A. (2021). An Introduction to Linear Mixed-Effects Modeling in R. *Advances in Methods and Practices in Psychological Science*, 4(1).
<https://doi.org/10.1177/2515245920960351>
- Cao, Z., Yu, S., & Huang, J. (2019). A qualitative inquiry into undergraduates' learning from giving and receiving peer feedback in L2 writing: Insights from a case study. *Studies in Educational Evaluation*, 63(September 2018), 102–112.
<https://doi.org/10.1016/j.stueduc.2019.08.001>
- Carless, D. (2012). Trust and its role in facilitating dialogic feedback. *Feedback in Higher and*

Professional Education: Understanding It and Doing It Well, January, 90–103.

<https://doi.org/10.4324/9780203074336>

Carlsson Hauff, J., & Nilsson, J. (2022). Students' experience of making and receiving peer assessment: the effect of self-assessed knowledge and trust. *Assessment and Evaluation in Higher Education*, 47(6), 959–971. <https://doi.org/10.1080/02602938.2021.1970713>

Caspi, A., & Blau, I. (2008). Social presence in online discussion groups: Testing three conceptions and their relations to perceived learning. *Social Psychology of Education*, 11(3), 323–346. <https://doi.org/10.1007/s11218-008-9054-2>

Cheng, K.-H., & Tsai, C.-C. (2012). Students' Interpersonal Perspectives on, Conceptions of and Approaches to Learning in Online Peer Assessment. *Australasian Journal of Educational Technology*, 28(4), 599–618.

https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ986300&lang=es&sc_oqe=site

Cho, Y. H., & Cho, K. (2011). Peer reviewers learn from giving comments. *Instructional Science*, 39(5), 629–643. <https://doi.org/10.1007/s11251-010-9146-1>

Double, K. S., McGrane, J. A., & Hopfenbeck, T. N. (2020). The Impact of Peer Assessment on Academic Performance: A Meta-analysis of Control Group Studies. *Educational Psychology Review*, 32(2), 481–509. <https://doi.org/10.1007/s10648-019-09510-3>

Dunn, P. K., & Smyth, G. K. (2018). *Generalized linear models with examples in R*. Springer.

Ertmer, P. A., Richardson, J. C., Belland, B., Camin, D., Connolly, P., Coulthard, G., Lei, K., & Mong, C. (2007). Using peer feedback to enhance the quality of student online postings: An exploratory study. *Journal of Computer-Mediated Communication*, 12(2), 412–433.

<https://doi.org/10.1111/j.1083-6101.2007.00331.x>

- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Field, A. P. (2009). *Discovering statistics using SPSS* (3^o Edition). Sage.
- Garson, G. D. (2014). Fundamentals of Hierarchical Linear and Multilevel Modeling. *Hierarchical Linear Modeling: Guide and Applications*, 3–26. <https://doi.org/10.4135/9781483384450.n1>
- Huisman, B., Saab, N., van Driel, J., & van den Broek, P. (2018). Peer feedback on academic writing: undergraduate students' peer feedback role, peer feedback perceptions and essay performance. *Assessment and Evaluation in Higher Education*, 43(6), 955–968. <https://doi.org/10.1080/02602938.2018.1424318>
- Huisman, B., Saab, N., Van Driel, J., & Van Den Broek, P. (2020). A questionnaire to assess students' beliefs about peer-feedback. *Innovations in Education and Teaching International*, 57(3), 328–338. <https://doi.org/10.1080/14703297.2019.1630294>
- Ion, G., Sánchez Martí, A., & Agud Morell, I. (2019). Giving or Receiving Feedback: Which Is More Beneficial to Students' Learning? *Assessment & Evaluation in Higher Education*, 44(1), 124–138. <https://doi.org/https://doi.org/10.1080/02602938.2018.1484881>
- Jones, M., Alexander, J., & Estell, D. (2010). Homophily among peer groups members' perceived self-regulated learning. *Journal of Experimental Education*, 78(3), 378–394. <https://doi.org/10.1080/00220970903548020>
- Kim, M. (2009). The impact of an elaborated assessee's role in peer assessment. *Assessment and Evaluation in Higher Education*, 34(1), 105–114. <https://doi.org/10.1080/02602930801955960>

- Li, H., Xiong, Y., Hunter, C. V., Guo, X., & Tywoniw, R. (2020). Does peer assessment promote student learning? A meta-analysis. *Assessment and Evaluation in Higher Education*, 45(2), 193–211. <https://doi.org/10.1080/02602938.2019.1620679>
- Li, L., & Grion, V. (2019). The Power of Giving Feedback and Receiving Feedback in Peer Assessment. *The Power of Giving Feedback and Receiving Feedback in Peer Assessment.*, 11(2), 1–17.
- Li, L., Liu, X., & Steckelberg, A. L. (2010). Assessor or assessee: How student learning improves by giving and receiving peer feedback. *British Journal of Educational Technology*, 41(3), 525–536. <https://doi.org/10.1111/j.1467-8535.2009.00968.x>
- Lu, J., & Law, N. (2012). Online peer assessment: Effects of cognitive and affective feedback. *Instructional Science*, 40(2), 257–275. <https://doi.org/10.1007/s11251-011-9177-2>
- Lundstrom, K., & Baker, W. (2009). To give is better than to receive: The benefits of peer review to the reviewer's own writing. *Journal of Second Language Writing*, 18(1), 30–43. <https://doi.org/10.1016/j.jslw.2008.06.002>
- Martin, I. A., & Sippel, L. (2021). Providing vs. receiving peer feedback: Learners' beliefs and experiences. *Language Teaching Research*. <https://doi.org/10.1177/13621688211024365>
- Martin, I. A., & Sippel, L. (2022). Do beliefs matter? The relationship between beliefs about peer feedback and peer feedback outcomes on pronunciation. *Language Teaching Research*. <https://doi.org/10.1177/1362168821097307>
- Martin, I. A., Sippel, L., Huisman, B., Saab, N., van Driel, J., van den Broek, P., Demiraslan Çevik, Y., Su, W., Huang, A., Ion, G., Sánchez Martí, A., Agud Morell, I., Li, L., Grion, V., Cao, Z., Yu, S., Huang, J., Li, L., Liu, X., ... Ropohl, M. (2021). More enjoyable to give or to receive? Exploring students' emotional status in their peer feedback of academic writing.

Assessment and Evaluation in Higher Education, 43(3), 1–11.

<https://doi.org/10.1080/02602938.2021.2004389>

McHugh, M. L. (2012). Lessons in biostatistics interrater reliability : the kappa statistic.

Biochemica Medica, 22(3), 276–282. <https://hrcak.srce.hr/89395>

Meteyard, L., & Davies, R. A. I. (2020). Best practice guidance for linear mixed-effects models in psychological science. *Journal of Memory and Language*, 112(March 2019).

<https://doi.org/10.1016/j.jml.2020.104092>

Montero, I., & León, O. G. (2007). A guide for naming research studies in Psychology.

International Journal of Clinical and Health Psychology, 7(3), 847–862.

Mulder, R. A., Pearce, J. M., & Baik, C. (2014). Peer review in higher education: Student perceptions before and after participation. *Active Learning in Higher Education*, 15(2),

157–171. <https://doi.org/10.1177/1469787414527391>

Müller, B., Richter, T., Križan, A., Hecht, T., & Ennemoser, M. (2016). How to Analyze

Interpersonal and Individual Effects in Peer-Tutored Reading Intervention. *Journal of*

Experimental Education, 84(4), 744–763. <https://doi.org/10.1080/00220973.2015.1065219>

Nicol, D., Thomson, A., & Breslin, C. (2014). Rethinking feedback practices in higher

education: a peer review perspective. *Assessment and Evaluation in Higher Education*,

39(1), 102–122. <https://doi.org/10.1080/02602938.2013.795518>

Noroozi, O., Alqassab, M., Taghizadeh Kerman, N., Banihashem, S. K., & Panadero, E. (2024).

Does perception mean learning? Insights from an online peer feedback setting. *Assessment and Evaluation in Higher Education*, 0(0), 1–15.

<https://doi.org/10.1080/02602938.2024.2345669>

O'Connor, B. P. (2000). *SPSS and SAS programs for determining the number of components*

using parallel analysis and Velicer's MAP test. Behavior Research Methods, Instrumentation, and Computers. 32, 396–402.

Panadero, E., Alqassab, M., Fernández Ruiz, J., & Ocampo, J. C. (2023). A systematic review on peer assessment: intrapersonal and interpersonal factors. In *Assessment and Evaluation in Higher Education* (Vol. 1). <https://doi.org/10.1080/02602938.2023.2164884>

Panadero, E., Jonsson, A., & Alqassab, M. (2018). Providing Formative Peer Feedback. *The Cambridge Handbook of Instructional Feedback*, 409–431. <https://doi.org/10.1017/9781316832134.020>

Patchan, M. M., Schunn, C. D., & Correnti, R. J. (2016). The nature of feedback: how peer feedback features affect students' implementation rate and quality of revisions. *Journal of Educational Psychology, 108*(8), 1098–1120. <https://doi.org/10.1037/edu0000103>

Reinholz, D. (2016). The assessment cycle: a model for learning through peer assessment. *Assessment and Evaluation in Higher Education, 41*(2), 301–315. <https://doi.org/10.1080/02602938.2015.1008982>

Rotsaert, T., Panadero, E., Estrada, E., & Schellens, T. (2017). How do students perceive the educational value of peer assessment in relation to its social nature? A survey study in Flanders. *Studies in Educational Evaluation, 53*, 29–40. <https://doi.org/10.1016/j.stueduc.2017.02.003>

Rotsaert, T., Panadero, E., & Schellens, T. (2018). Anonymity as an instructional scaffold in peer assessment: its effects on peer feedback quality and evolution in students' perceptions about peer assessment skills. *European Journal of Psychology of Education, 33*(1), 75–99. <https://doi.org/10.1007/s10212-017-0339-8>

Senden, M., De Jaeger, D., & Coertjens, L. (2023). Safe and sound: examining the effect of a

- training targeting psychological safety and trust in peer assessment. *Frontiers in Education*, 8(June), 1–13. <https://doi.org/10.3389/feduc.2023.1198011>
- Senden, M., De Jaeger, D., Rotsaert, T., Leroy, F., & Coertjens, L. (2023). *How to Make Students Feel Safe and Confident? Designing an Online Training Targeting the Social Nature of Peer Feedback*. Springer International Publishing. https://doi.org/10.1007/978-3-031-29411-2_15
- Singmann, H., & Kellen, D. (2019). An introduction to mixed models for experimental psychology. *New Methods in Cognitive Psychology*, 4–31. <https://doi.org/10.4324/9780429318405-2>
- Strijbos, J. W., Narciss, S., & Dünnebier, K. (2010). Peer feedback content and sender's competence level in academic writing revision tasks: Are they critical for feedback perceptions and efficiency? *Learning and Instruction*, 20(4), 291–303. <https://doi.org/10.1016/j.learninstruc.2009.08.008>
- Su, W. (2023). Masked ball for all: how anonymity affects students' perceived comfort levels in peer feedback. *Assessment and Evaluation in Higher Education*, 48(4), 502–512. <https://doi.org/10.1080/02602938.2022.2089348>
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Pearson.
- Tooping, K. (1998). Peer assessment between students in colleges and universities. *Review of Educational Research*, 68(3), 249–276. <https://doi.org/10.3102/00346543068003249>
- Topping, K. J. (2010). Methodological quandaries in studying process and outcomes in peer assessment. *Learning and Instruction*, 20(4), 339–343. <https://doi.org/10.1016/j.learninstruc.2009.08.003>
- Tsivitanidou, O. E., & Constantinou, C. P. (2016). A study of students' heuristics and strategy

- patterns in web-based reciprocal peer assessment for science learning. *The Internet and Higher Education*, 29, 12–22. <https://doi.org/10.1016/j.iheduc.2015.11.002>
- van der Pol, J., van den Berg, B. A. M., Admiraal, W. F., & Simons, P. R. J. (2008). The nature, reception, and use of online peer feedback in higher education. *Computers and Education*, 51(4), 1804–1817. <https://doi.org/10.1016/j.compedu.2008.06.001>
- van Gennip, N. A. E., Segers, M. S. R., & Tillema, H. H. (2009). Peer assessment for learning from a social perspective: The influence of interpersonal variables and structural features. *Educational Research Review*, 4(1), 41–54. <https://doi.org/10.1016/j.edurev.2008.11.002>
- Van Meenen, F., Masson, N., Catrysse, L., & Coertjens, L. (2023). Taking a closer look at how higher education students process and use (discrepant) peer feedback. *Learning and Instruction*, 84(November 2022). <https://doi.org/10.1016/j.learninstruc.2022.101711>
- van Zundert, M. J., Sluijsmans, D. M. A., Könings, K. D., & van Merriënboer, J. J. G. (2012). The differential effects of task complexity on domain-specific and peer assessment skills. *Educational Psychology*, 32(1), 127–145. <https://doi.org/10.1080/01443410.2011.626122>
- van Zundert, M., Sluijsmans, D., & van Merriënboer, J. (2010). Effective peer assessment processes: Research findings and future directions. *Learning and Instruction*, 20(4), 270–279. <https://doi.org/10.1016/j.learninstruc.2009.08.004>
- Wichmann, A., Funk, A., & Rummel, N. (2018). Leveraging the potential of peer feedback in an academic writing activity through sense-making support. *European Journal of Psychology of Education*, 33(1), 165–184. <https://doi.org/10.1007/s10212-017-0348-7>
- Wu, Y., & Schunn, C. D. (2020). The Effects of Providing and Receiving Peer Feedback on Writing Performance and Learning of Secondary School Students. In *American Educational Research Journal* (Vol. 58, Issue 3, pp. 492–526).

<https://doi.org/https://doi.org/10.3102/0002831220945266>

Wu, Y., & Schunn, C. D. (2023). Passive, active, and constructive engagement with peer feedback: A revised model of learning from peer feedback. *Contemporary Educational Psychology, 73*(January), 102160. <https://doi.org/10.1016/j.cedpsych.2023.102160>

Yan, Z., Lao, H., Panadero, E., Fernández-Castilla, B., Yang, L., & Yang, M. (2022). Effects of self-assessment and peer-assessment interventions on academic performance: A meta-analysis. *Educational Research Review, 37*(September), 1–15.

<https://doi.org/10.1016/j.edurev.2022.100484>

Zhan, Y. (2024). Are they ready? An investigation of university students' difficulties in peer assessment from dual perspectives. *Teaching in Higher Education, 29*(4), 823–840.

<https://doi.org/10.1080/13562517.2021.2021393>

Zou, Y., Schunn, C. D., Wang, Y., & Zhang, F. (2018). Student attitudes that predict participation in peer assessment. *Assessment and Evaluation in Higher Education, 43*(5), 800–811. <https://doi.org/10.1080/02602938.2017.1409872>

Appendix A

Rubric used to rate cover letter analysis (Task1,2 and 3)

Quality criteria \ Score	4	3	2	1
Experience	I have identified the candidate's experience (low, medium, high). I have pointed out the jobs he/she has held and how long he/she has been in them. As well as the deductions I can draw from it.	I have identified the candidate's experience (low, medium, high) and noted the jobs he/she has held and how long he/she has been in them.	I have identified the candidate's experience (low, medium, high).	I have not identified or have misidentified the candidate's experience (low, medium, high).
Technical capacity	I have identified what is the technical capacity of the candidate. I point out how they are aligned with the position and if the low technical capacity can be relativized and iustifv it.	I have identified what the candidate's technical capabilities are. I point out how they are aligned with the position and if the low technical canabilitv can be relativized.	I have identified the candidate's technical capacity.	I have not identified or have misidentified the candidate's technical capacity.
Relational capacity	I have identified in the letter the relational capacity of the candidate. I have identified in the letter the relational capacity of the candidate. I have indicated if the relational capacity is important for the position and therefore if it is a capacity with which the technical capacity or experience can be relativized and I justify it.	I have identified in the letter the relational capacity of the candidate. I have pointed out if the relational capacity is important for the position and therefore if it is a capacity with which the technical capacity or experience can be relativized.	I have identified the candidate's relational capacity.	I have not identified or have misidentified the candidate's relational capacity.
Flexibility	I have identified the flexibility (if you are able to adapt, train on new tools...etc.). I report whether it can be positively or negatively relativized with respect to experience or technical capacity and justify it.	I have identified flexibility (if he/she is able to adapt, train in new tools, etc.). Informs can be relativized positively or negatively with respect to experience or technical capacity.	I identified the candidate's flexibility (if he/she is able to adapt, train in new tools...etc.).	I did not identify or misidentified the candidate's flexibility (if he/she is able to adapt, train in new tools...etc.).
Vocation	I have identified the candidate's vocation. I report if according to his level of vocation he can be a passive employee, listless with little self-demand and I justify it.	I have identified the candidate's vocation. Informs if according to his level of vocation he can be a passive employee, unenthusiastic with little self-demand.	I have identified the candidate's vocation (why did he/she choose the position, did he/she have a career opportunity).	I did not identify or I misidentified the candidate's vocation (why did he/she choose the position, did he/she have a career opportunity).
Salary range	I have reported the appropriate salary range for the candidate. I have taken into account experience, technical ability and flexibility to justify it.	I have reported the appropriate salary range for the candidate. Has one of the following to justify it: experience or technical ability or flexibility.	I have identified the appropriate salary range for the candidate.	I have not informed, or I have misinformed about the appropriate salary range for the candidate.
Main psychological need activated	I have reported the main psychological need of the candidate. I take into account experience, relational ability and vocation.	I have reported the candidate's primary psychological need. I have had one of the following to justify it: experience, relational ability and vocation.	I have identified the candidate's main psychological need.	I have not informed or have misinformed about the candidate's main psychological need (high, medium or low).

Appendix B

Tasks used in the study

Task 1

Profile: Administrative assistant position at Atenea Events.

Thanks to my two years of experience in a similar position at Helara Corp, I now have extensive experience handling accounting books for companies of international stature. I believe I fit that profile since, in my current job, I have been able to reduce the filing and organisation times of printed and digital documents by 15%. In addition, I am familiar with digital tools and accounting tools. I have reduced stationery expenses by 20% thanks to the commercial agreements I reached with suppliers. Currently, I would be willing to learn how to use other tools, and I would be flexible to adapt to new responsibilities. I have a great capacity to react to unforeseen events and conflict resolution. The organisation of events has always been one of my passions; I have followed very closely the history of Atenea Events. The Christmas parades and the book festival that the company has organized every year since I was a child have inspired me to work hard to someday be part of their great team.

Identify experience, technical capacity, relational capacity, flexibility and vocation. Based on these, define the salary range (high, medium, low) and the main psychological need activated. Max 250-260 words.

Task 2

Profile: Cleaning personnel position.

During my four years of experience in the cleaning sector, I have developed the activities of scrubbing, dusting, sweeping, and polishing furniture, floors, windows and electromechanical elements in different spaces such as offices, study centers and public spaces. I am knowledgeable about the tasks necessary to maintain the quality and cleanliness of shared spaces, the organisational structure of the workers and the materials

and tools. During my workday, I focus solely on my work, seeking the highest productivity while avoiding unnecessary distractions or interactions with colleagues.

During my experience in other companies where I have worked with new digital tools, I am familiar with them, although I am more familiar with the analogic system. My interest in this position lies in the conditions, similar to previous jobs I have worked in. In this way, I can continue to perform the same functions in which I have specialized and consider myself to be fully qualified.

Identify experience, technical capacity, relational capacity, flexibility and vocation. Based on these, define the salary range (high, medium, low) and the main psychological need activated. Max 250-260 words.

Task 3

Profile: Customer Service Job Profile.

I have experience in my practice center, where I have developed my career, assuming responsibilities linked to resolving problems and issues on the part of customers. During my internship, I have developed a work method in which I can efficiently attend customer calls, maintaining the quality of the service. In addition, I have successfully collaborated with other departments, such as the Department of Communication with suppliers and transport companies or the Department of Communication Management through social networks. Despite having completed my internship, the company where I did my internship gave me access to training offered to employees, and I have a good relationship with my managers and colleagues. I attach a letter of recommendation written by my managers in one of the attached documents. I am currently starting my career in this sector, and I would be willing to move and adapt to the conditions offered to me. I would not mind moving and training in new tools. I want to contribute with my knowledge and skills developed within a company of national relevance as ALTUDOG SL. to continue learning and achieving new objectives in the short, medium and long term.

Identify experience, technical capacity, relational capacity, flexibility and vocation. Based on these, define the salary range (high, medium, low) and the main psychological need activated. Max 250-260 words.

Appendix C

Detailed explanation of the scheme used to standardize the individual feedback and create fictional peer solution.

Scheme for fictional peer feedback.

The scheme used to standardize the individual feedback of the students included the types of feedback described by Strijbos et al. (2010): concise general feedback (CGF) and elaborated Specific Feedback (ESF).

Concise general feedback (CGF) does not specifically point out the problems or successes and does not explain them.

Elaborated Specific Feedback (ESF) gives specific and elaborated answers and suggestions. Strijbos et al. (2010) also differentiate between the feedback component within the type of feedback which there are:

- **KR (knowledge of result):** Knowledge of result tells you whether a result is right or wrong. In the case of the CGF, all messages will be "KR." For example: "Flexibility has been confused with vocation (ESF, KR)."
- **KM (knowledge of mistake):** Knowledge of mistake, why it is wrong (e.g., the justification is wrong because it is poorly argued).
- **KH (knowledge on how to proceed):** Knowledge of how to proceed gives indications on how to do it right (e.g., you should change this argumentation to the topic of the text based on the example).

The feedback was standardized by giving each student feedback that includes (1) both feedback types CGF and ESF, and (2) all the different components of feedback, KM and KH. Each type and feedback component are associated with one task characteristics (experience, technical skills). So, all students will receive CGF from the characteristics "Experience", but it was individualized depending on whether their solution is correct or wrong. To recreate real peer feedback, two characteristics were be tagged as "not accurate feedback" (e.g., if the student has the response right, give feedback that says it is wrong). See Table 1.

Table 1

Fictional peer feedback example.

Feedback type and component	Content	Fictional peer feedback
CGF	Experience	"I consider the experience to be okay."
ESF (KR) (not accurate)	Technical skills	" Regarding the technical capability, I would say it is wrong or incomplete does not match the candidate's description."
CGF	Relational skills	" I would say that you have the relational capacity its correct."
ESF (KR KM)	Flexibility	"The truth is that flexibility is well identified, but I think that to improve it you could explain if in this case, it applies that with a high flexibility you can relativize the fact that you have little experience or technical ability."
CGF	Vocation	"About vocation I would say that it is wrong, it is a wrong answer."
ESF (KR)	Salary	"Analysing your answer to the salary range I would say that it is very well, you have mentioned two of the following characteristics to justify it: experience, technical ability and flexibility."
CGF (not accurate)	Psychological need	" Finally, I would say that the main psychological need activated is fine."

Note: "Not accurate" means that it does not fit the reality of the text, so it is "wrong" feedback; Original fictional peer feedback was written in Spanish.

Fictional peer solution

When crafting the fictional peer task, all the response possibilities were considered and equally represented within the fictitious response, similar to the process carried out by Alqassab et al. (2018b). The different answers included were: (1) Identified but with no reasoning, (2) Identified and with incorrect reasoning, (3) Just identified without reasoning (4) Identified and with correct reasoning. See the Table 2.

Table 2

Fictional peer solution that students receive when acting as assessors

Type of solution	Fictional peer solution.
Identified, but with no reasoning.	"Track record in a single company with two years of experience."
Identified and with incorrect reasoning.	"Technical skills for the position include organization of printed documents and familiarity with digital and accounting tools. Therefore, these tools are not aligned with the position."
Just identified without reasoning.	"Has high relational skills. This is an element to consider since this ability is relevant to the position."
Identified and with correct reasoning.	"Regarding flexibility, he shows willingness and ease to adapt to contextual changes. He is open to new responsibilities, as indicated in the text in the line beginning: "Currently he would be willing...". This shows that he/she can adapt to the

	organization's objectives, which compensates if the student does not have high technical skills or experience.”
Identified with no reasoning.	“I identify the vocation characteristics at the end of the description; the candidate has a high vocation.”
Mentioned, with correct reasoning.	“I identify the salary range thanks to my experience and flexibility. Although he may not have many years of experience, he shows great flexibility and willingness, sometimes related to a higher salary.”
Mentioned, but with incorrect reasoning .	“The primary psychological need activated is low.”

Note: Original was written in Spanish

It is important to highlight that the information that students get either by receiving (fictional peer feedback) or giving (fictional peer solution) was equalized to compare them. It was systematically equalized by associating the type of feedback the student received with a type of response with similar characteristics in terms of content. For example, when students receive concise general feedback on the characteristics experience, the fictional peer solution in that characteristic is “identified but with no reasoning”. This equalization was done to compare them and to ensure that differences in the content of the two do not produce bias in the results when comparing outcomes like performance or eye-tracking measures.