

## Do achievement goals and self-efficacy matter for feedback use?

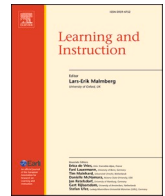
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# Do achievement goals and self-efficacy matter for feedback use?

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## ABSTRACT

**Background:** Instructor feedback in higher education is widely acknowledged as being beneficial for learning and achievement. Students' motivation as a central determinant of how students perceive feedback and incorporate it into their learning process offers potential to explain and foster successful feedback use but is still little understood. In detail, students' achievement goals, serving as representations of what students strive for in learning settings, and students' self-efficacy for revision, are two particularly relevant motivational concepts that can offer insights into how students perceive feedback and use it for revising their work.

**Aims:** In this study, we aim to elucidate how achievement goals and self-efficacy explain feedback perception and use.

**Methods and Sample:** A sample of 182 German higher education students reported on their achievement goals for a task, self-efficacy for revising their task, perceived usefulness of the feedback they received, and achievement emotions when reading their feedback in three separate feedback occasions. The use of the feedback for revising their task was measured with both self-report measures and a computer-based similarity score.

**Results:** Results of two-level path modeling revealed self-efficacy for revision to be linked to perceived usefulness of feedback and emotions while receiving feedback, as well as feedback use. Learning and work avoidance goals for the task predicted perceived usefulness of feedback, which was in turn the strongest predictor of feedback use.

**Conclusions:** The findings support the theoretical role of motivational factors for feedback perception and use, and emphasize the importance of fostering students' self-efficacy in utilizing feedback and encouraging learning goals.

Feedback is a key element of learning and instruction, with the potential to greatly enhance learning and achievement. This notion has been proposed and corroborated in an array of research (e.g., Hattie & Timperley, 2007), including higher education teaching contexts (Evans, 2013). Particularly in higher education, instructor/tutor feedback provides students with much-needed guidance and interaction (Rowe, 2011). At the same time, there is a limited understanding of how students perceive the feedback they receive, as well as how and why they use it (Van der Kleij & Lipnevich, 2021). This poses challenges from both theoretical and practical perspectives: To accurately describe how feedback impacts learning and achievement and to effectively guide students in its use, it is important to understand the factors that drive students to use or not to use feedback.

From a theoretical perspective, considering students' motivation offers a fruitful avenue to better understand how they perceive and why they choose to use feedback, e.g., for revising assignments, as motivation inherently provides insights into why students initiate, continue, or

terminate certain behaviors (Dresel & Hall, 2013). Despite its explanatory potential, the relevance of motivation for successful feedback processes has been largely neglected in prior research and warrants systematic investigation (Fong & Schallert, 2023). We follow up on this by taking a motivational perspective to investigate how students perceive written feedback, provided by a tutor, and use it for revision.

## 1. Theory

### 1.1. Scope: definition and process of tutor feedback

The term "feedback" embodies multiple, quite different concepts (Panadero & Lipnevich, 2022). In the context of the present research, we narrow our focus to feedback that (a) contains information about the learning and/or achievement of a student provided by an external agent (e.g., tutor; Hattie & Timperley, 2007), (b) is directed at changing the students' thinking and/or behavior to improve learning or performance

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(Shute, 2008), and (c) may consist of quantitative but mainly of qualitative information (Gielen et al., 2010). Feedback falling under this definition can elicit various effects depending on its content. More specifically, feedback that is focused on personal characteristics of the learner might drive students to react differently than feedback focused on learning strategies or answer content (Hattie & Timperley, 2007). Thus, to elucidate how motivational factors are linked to feedback perception and use, it is important to consider the type of feedback students receive.

Within higher education, the significance of receiving feedback extends beyond grades. Particularly in settings characterized by large and rather impersonal classes, such as those found in higher education contexts, feedback provides students with support for their learning and interaction with teachers/tutors (Rowe, 2011). Based on this conception, feedback harbors considerable potential for enhancing learning and instruction in higher education, however, students often do not make use of this potential (Winstone, Nash, Rowntree, & Parker, 2017). Thus, in this study, we focus on a feedback process typical to higher education, where students submit written assignments and subsequently revise them after receiving feedback digitally. Through this, we aim to elucidate how students' motivation is connected to their feedback perceptions and their use of feedback for revising their assignments.

Students' emotional responses to feedback, their perception of its usefulness, and to which extent and depth they integrate it into their revisions are likely influenced not only by the feedback content, but also by their motivational tendencies. These encompass, among other aspects, their goals within the situation and their perception of their own skills to deal with the feedback (Fong & Schallert, 2023). This way, students' achievement goals provide a benchmark for interpreting the feedback they receive, informing about the value they attribute to the feedback (Dresel & Hall, 2013). Following expectancy-value theory, in order to be motivated to use feedback, students must not only possess the desire to use feedback, but also believe that they are capable of effectively integrating it (Wigfield & Eccles, 2000). For the expectancy component, self-efficacy beliefs are relevant for feedback perception (Fong & Schallert, 2023). Consequently, we strive to explain students' feedback perception and how they use it to revise their assignments by investigating students' achievement goals for their assignments and their self-efficacy in relation to the revision process.

## 1.2. Role of achievement goals for perception and use of feedback

In learning and achievement contexts, students strive to reach or avoid different end states, ranging from learning new concepts or making a good impression to investing as little effort as possible. These types of goals are described in achievement goal approaches (Elliot, 2005; Hulleman et al., 2010). Achievement goals shape how students feel and act in achievement contexts (e.g., Daumiller & Janke, 2020; Pintrich, 2000). The most commonly distinguished types of goals are learning goals,<sup>1</sup> performance approach goals, and performance avoidance goals; additionally work avoidance goals are frequently considered (Daumiller, 2023) and appear of high relevance for using feedback.

Students pursuing strong learning goals for an assignment are focused on learning and competence development through engagement with the task. Conversely, students pursuing performance goals are concerned with how they appear in front of others, particularly their tutors, who teach their lessons, provide feedback, and grade their assignments. While with performance approach goals, students strive to appear as competent as possible, students with performance avoidance

goals are focused on avoiding appearing incompetent (Hulleman et al., 2010; Spinath & Stiensmeier-Pelster, 2003). Lastly, work avoidance goals are directed at getting by with as little effort as possible.

Early achievement goal theory approaches were based, among other aspects, on how learners react to competence feedback. This pertained to whether learners showed adaptive or maladaptive behavior when facing failure (Korn et al., 2019). In this context, Dweck (see Elliott & Dweck, 1988; Smiley & Dweck, 1994) proposed that children prioritizing learning within a task (i.e., pursuing learning goals) should interpret even negative competence feedback as stepping stones for their learning progress. In this case, feedback, even with negative valence, should prompt them to increase their effort. Conversely, learners who perceive a task as a stage to demonstrate competence (i.e., pursuing performance goals) were expected to interpret negative competence feedback as an indication of lacking the required competence, thereby responding with maladaptive, helpless behavior (Elliott & Dweck, 1988; Smiley & Dweck, 1994). Later achievement goal conceptions acknowledged that performance-orientation might not necessarily be maladaptive (Murayama et al., 2012). Instead, performance approach goals (aiming to demonstrate competence) were found to be linked to more adaptive behavior, while performance avoidance goals (aiming to avoid appearing incompetent) were more consistently linked to maladaptive patterns (Harackiewicz et al., 2002).

Applied to the case of feedback in higher education, students might try to learn and improve from the feedback that they receive from their tutors (reflected in a pursuit of learning goals). However, they might also try to appear competent by submitting high quality work (performance approach goals). In both cases, feedback can be perceived as a helpful opportunity, as it offers insights into correctable mistakes, and thus, these students should perceive feedback as useful for reaching their goals (either learning gains or performance enhancement) and consequently thoroughly engage with it to improve their understanding and/or their submission. Relatedly, Rakoczy et al. (2013) found that students perceived their feedback as more useful when they strongly pursued mastery goals focused on learning. Conversely, it is plausible that students who pursue performance avoidance goals do not perceive feedback as useful, as negative feedback may demonstrate their lacking competence (see Elliott & Dweck, 1988), and they might refrain from engaging too deeply with it, as this would confirm potentially negative competence appraisals. Specifically, this is expected to stem from students devaluating feedback to reduce self-worth threat, thus perceiving it as less helpful and using it less. In a study outside of the educational context by Anseel et al. (2011), individuals with a strong performance goal orientation responded more negatively to comparative feedback than individuals with a weaker performance goal orientation. Similarly, it is plausible that students with strong work avoidance goals use feedback to revise their texts only to a minimal extent in order to reduce effort. Students pursuing the latter two goals (performance avoidance goals and work avoidance goals) should thereby perceive feedback as less helpful and, consequently, implement it less (see also Fong & Schallert, 2023).

It is worth noting that students pursuing learning goals and students pursuing performance approach goals are both expected to perceive feedback as useful and use it accordingly, even though the reasons for their use might be entirely different, ranging from broadening their knowledge about the topic at hand to appearing as competent as possible in front of the tutor evaluating their work.

As achievement goals shape students' perceptions of favorable outcomes in an achievement situation, it follows that their emotional reactions to feedback should also be connected to their achievement goals. Evidence supports this reasoning, showing that achievement goals are closely tied to emotions in achievement contexts (Huang, 2011). Learning goals are connected to positive emotions like joy (Goetz et al., 2016), while avoidance-focused goals are more connected to negative emotions like anxiety (see Linnenbrink & Pintrich, 2002). Based on this, students pursuing learning goals should experience comparably more

<sup>1</sup> In achievement goal theory, mastery goals (as opposed to performance goals) are often distinguished into learning goals and task goals – two goal classes that are similar, but not exchangeable (Hulleman et al., 2010). In our study, we focus on learning goals within the mastery goal component, so we use the term “learning goals” consistently.

positive and less negative emotions when reading their feedback, even if it highlights their errors, since they perceive it as either a form of positive reinforcement or a learning opportunity to help them reach their goal. Performance approach goals have been found to be positively associated with pride (Goetz et al., 2016). In contrast, students with strong performance avoidance goals should experience rather negative emotions like shame or anxiety, as feedback illustrates their mistakes and suggests that tutors are aware of their weaknesses (Goetz et al., 2016).

### 1.3. Role of self-efficacy for perception and use of feedback

To profit from the feedback they receive, students' achievement goals need to be shaped in a way that makes them want to improve from their feedback. However, to be motivated to use the feedback for revising their work, they also need to feel that they are capable of doing so, i.e., hold high self-efficacy beliefs (Bandura, 1997). Following Bandura (1997), self-efficacy for revision in this context entails students' beliefs about being able to use the feedback to improve their assignment, even if difficulties arise during revision. From a theoretical perspective, self-efficacy is associated with how feedback is perceived and used (Fong & Schallert, 2023; Van der Kleij & Lipnevich, 2021). Within this, it is important to acknowledge that self-efficacy is context specific. In the present study, we were interested in understanding students' beliefs regarding their ability to effectively use their feedback for revising their work and as such, we placed a focus on students' self-efficacy for the specific context of revising their assignments using the feedback they received. Specifically, students might not perceive feedback as useful if they do not feel that they are able to integrate it into their own work, signifying low self-efficacy. Their motivation to try to implement the feedback may thereby be diminished due to low expectations of achieving success (Wigfield & Eccles, 2000).

The notion that feedback can shape self-efficacy is rooted in its original conceptualization (Bandura, 1997) and supported by research (see Fong et al., 2019). However, the reverse direction of this relationship—how self-efficacy impacts perceptions of feedback—is much less researched (Panadero et al., 2023). Winstone, Nash, Parker, and Rowntree (2017) reported that students with higher self-efficacy spent more time on received feedback than students with lower self-efficacy, aligning with our theoretical reasoning. This might be attributable to students with higher self-efficacy being more interested in how they can improve and actionable steps they can take (Duijnhouwer et al., 2012). These processes are potentially complex and also depend on feedback valence, i.e., on whether the students receive positive or negative feedback. Within the context of the present study, where students receive content-related feedback on how to improve for the specific assignment at hand, the main influence of self-efficacy can be narrowed down to the question of whether students think they are able to implement the suggested changes and improve the weaknesses of their work through the feedback.

Students' belief in their ability to reach their goals, as encompassed by self-efficacy, is closely connected to the experience of achievement emotions (Frenzel et al., 2009). Based on this, it stands to reason that there should also be a link between students' self-efficacy for revision and their emotional reactions to the feedback they receive. Students with high self-efficacy should tend to experience more positive emotions (e.g., joy) and less negative emotions (e.g., shame) than students with low self-efficacy, as they feel competent to improve from the feedback. Conversely, students with low self-efficacy beliefs can be expected to experience more shame and anxiety when facing feedback compared to their high self-efficacious counterparts, as they might be worried about not being able to meet the demands outlined in the feedback (Turner & Schallert, 2001).

### 1.4. Capturing feedback perception and use

Feedback perception entails students' comprehension, appreciation, and value of a feedback message they receive and includes both affective and cognitive components (Van der Kleij & Lipnevich, 2021). Affective components of feedback perceptions can be captured by examining achievement emotions experienced by students when receiving feedback. As feedback contains evaluation of performance, it can elicit both positive and negative emotions, depending on its valence (Harris et al., 2014). Empirically, achievement emotions that students might experience when receiving feedback include, for example, joy and pride, (Mahfoodh & Pandian, 2011; Pitt & Norton, 2017) as well as shame as the negative counterpart of pride. Furthermore, when students need to implement their feedback to revise their work, they possibly feel anxious concerning the task and the possible outcome. Based on this, asking students about the discrete emotions they experience when reading their feedback is a meaningful way of capturing affective perceptions of the feedback they receive.

Following control-value theory (Pekrun, 2006), outcome-emotions like joy, pride, shame, and anxiety affect the way learners continue with their learning. Joy and pride, as activating positive emotions, strengthen the willingness to learn and thus should lead students to use their feedback to revise their work extensively. As joy is also thought to foster flexible learning strategies, experience of joy when reading the feedback should lead to a qualitatively successful revision. The effects of experiencing anxiety and shame, as activating negative emotions, on feedback use are theoretically more complex, as they could both hinder intrinsic motivation and deep learning strategies but act as strong externally motivating factors to drive effort into using feedback for revision to avoid failure (Pekrun, 2006). Consequently, we would expect students experiencing shame or anxiety while reading their feedback to use the feedback to revise their work extensively, but with only little qualitative improvement.

In addition to achievement emotions, a central component of students' feedback perception stemming from a cognitive perspective is their assessment of its usefulness for their learning: Feedback that is perceived as helpful will be used more than feedback that is perceived as unhelpful (Jonsson, 2013). In contrast to other dimensions of feedback perception, such as perceived feedback quality, perceived usefulness encompasses how a learner perceives their feedback in relation to their own ability to use the feedback (i.e., self-efficacy) as well as how it aligns with their own goals linked to the feedback (i.e., achievement goals). Based on this, perceived usefulness should, on the one hand, be closely related to learners' motivation, and on the other hand, to how and to which extent they use the feedback to revise their work. Drawing back on expectancy-value theory (Eccles & Wigfield, 2020), perceived usefulness of the feedback at hand can be seen as a form of situated utility value. As such, students placing high utility value on the feedback would be expected to use feedback extensively to revise their work. Reiterating this, in a review by Jonsson and Panadero (2018) perceived usefulness was identified as one of three critical conditions for students' active engagement with feedback, pointing to its significance.

It is widely asserted that feedback needs to be actively used by students to create a positive impact on their learning and achievement (Jonsson, 2013; Winstone, Nash, Parker, & Rowntree, 2017). Yet, it is not trivial to capture whether and how students use the feedback they receive, given that feedback can be used for learning and achievement in different ways. In the context of feedback on written assignments, students could, for instance, employ the feedback to correct their own misconceptions without visibly modifying their assignment. Alternatively, they might substitute numerous words in their assignment without causing any shift in the underlying meaning.

These multiple layers of feedback implementation imply that feedback use in revision needs to be captured in ways that can be combined to paint a more comprehensive picture of how feedback is used (see Fong & Schallert, 2023). As illustrated, feedback use can encompass both

internal and external processes, as well as qualitative and quantitative aspects. Thus, a measure of feedback use in revision should incorporate both student-assessed and more objective measures, as well as qualitative and quantitative dimensions. In our study, we measure feedback use for revision by asking students to which extent they changed their text and how much the quality of their assignment improved by using the feedback for revision, and we additionally used a computer-based measure to gauge how much students changed their work.

### 1.5. Research question and hypotheses

Given the potential of motivation to explain how students perceive feedback and why they (do not) use it, and in the light of the limited research to this end, we aim to address this gap by asking how achievement goals and self-efficacy as motivational aspects matter for students' perception and use of written tutor feedback. We investigated these questions in a higher education course, implementing an ecologically valid design that is much needed in current research on feedback. Within this, we focus on individual differences between students. A summary of all hypotheses can be found in Fig. 1.

Firstly, we propose that both achievement goals and self-efficacy for successfully revising the assignment are associated with perceived usefulness of the tutor feedback at hand (H1/H4), emotional reactions to feedback (H2/H5), and the extent to which feedback is used for revising the assignment (H3/H6). Regarding achievement goals, we expect learning goals and performance approach goals to be positively associated with perceived usefulness, positive emotions, and feedback use for revising the assignment, and negatively associated with negative emotions; for performance avoidance goals and work avoidance goals, we expect these associations to be reversed. Moreover, self-efficacy is expected to be linked positively with positive emotions and negatively with negative emotions after reading the feedback, and positively linked to feedback use.

Finally, we expect perceived usefulness to be positively associated with feedback use (H7). Emotions are expected to be related to how extensively feedback is used and with the quality of improvement. All four activating emotions (joy, pride, shame, and anxiety) should be positively linked to the extent of feedback being used for revision. Joy and pride should be positively linked, and shame and anxiety should be negatively linked to the quality improvement of the revision (H8).

## 2. Method

To test our hypotheses, we conducted a field study in a large educational psychology course at a German university in which students were required to submit weekly written assignments of approximately 1.5 pages, deepening their understanding of psychological theories and applying them to teaching-related problems. For our study, students received digital, written feedback on three of these assignments by the tutors teaching this course, namely in weeks 3, 5, and 9, and subsequently submitted revised versions of their assignments. Resubmission was mandatory for these three assignments. Tutors provided feedback to each student five days past the due date in a standardized scheme, following the feed back, feed-up, and feed-forward principles by Hattie and Timperley (2007), i.e., providing information about whether the necessary goals of the task were reached and how to reach them better (see S1 in the supplementary material for details). There was no feedback on the other assignments in this course.

We asked students to report on their achievement goals for the written assignments in the second week of the semester. Each time they received feedback, students reported on their achievement emotions, perceived usefulness of the feedback, and their self-efficacy for revision. After revision, they reported on how they used the feedback for revising their work. Through this procedure, we generated three measurement points on three separate feedback occasions throughout one semester (see Fig. 2 for an overview). All questionnaires were embedded as links

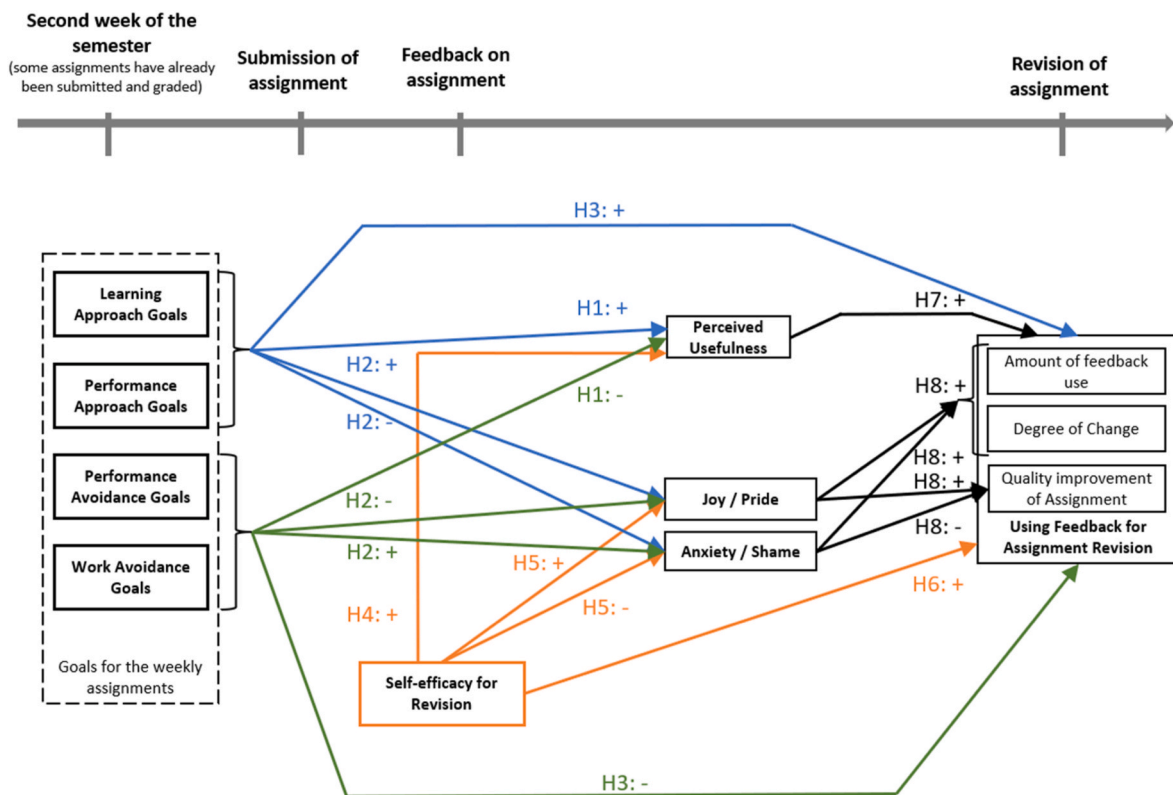


Fig. 1. Expected relations between achievement goals, self-efficacy for revision, feedback perceptions (perceived usefulness, achievement emotions), and feedback use for revision.



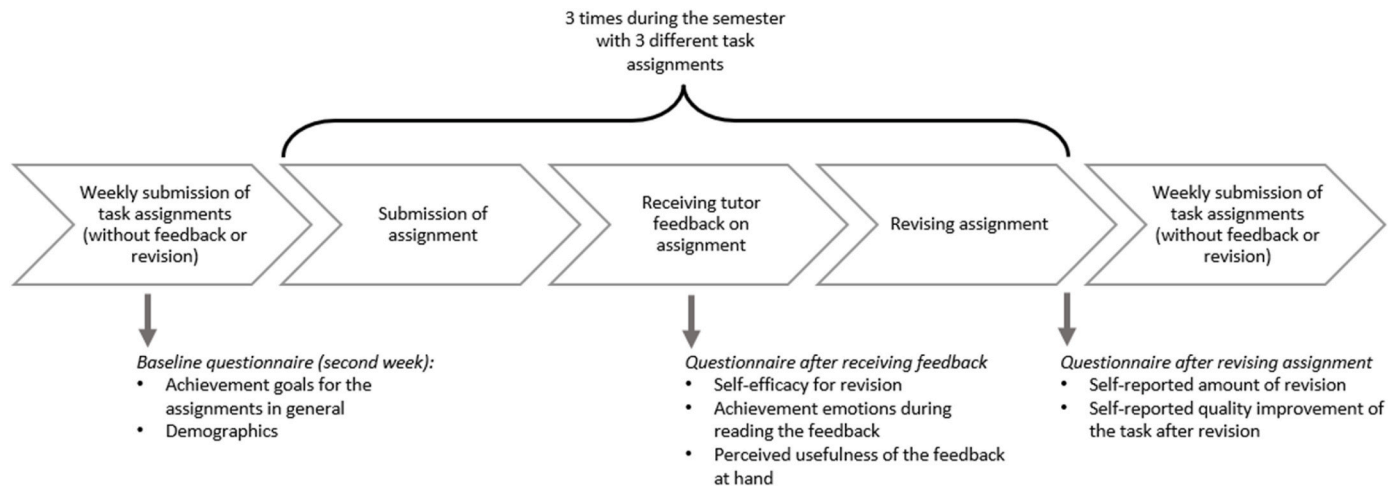


Fig. 2. Overview of the study design.

within the university learning management system in which students submitted their assignments and received their feedback, respectively attached to the feedback or the revision assignment for each measurement point. The study adhered to ethical standards and was deemed unproblematic in this regard by the local IRB board [details anonymized for peer review]. The data and analytical script to reproduce the results for this study can be found in an open repository [details anonymized for peer review].

## 2.1. Sample

In the second semester week, 218 students within the selected course participated in our baseline survey (61.0% female, 32.9% male;  $M_{age} = 20.77$ ;  $SD_{age} = 2.49$ ). They were enrolled in various teaching programs, with the majority being in the first (74.8%) or second year (18.8%) of their studies. Students received course credit for study participation. To ensure data quality, we implemented attention check items within each questionnaire (single items, e.g., “Please check the third box from the right.”) and excluded all participants who failed to answer the attention checks correctly in at least one of the 7 questionnaires (baseline plus two questionnaires at each measurement point). This resulted in 483 observations of 182 participants across all three measurement points (T1: 162, T2: 157, T3: 166 observations) with 134 students who fully participated in every measurement point.

## 2.2. Measures

We used and partly adapted established instruments to measure the motivational aspects we were interested in, changing those as little as possible and not changing the rating scales. All motivational aspects, aside from the achievement goals, were assessed regarding the respective feedback the students just received. Achievement goals were measured in the second semester week in reference to the weekly task assignments.

### 2.2.1. Measures of motivational aspects and emotions

**Achievement goals.** Achievement goals for the assignments during the semester were measured according to Daumiller et al. (2019), using four items each, assessed on an 8-point Likert-scale from *do not agree* to *fully agree*. The item stem “When I do or revise the assignments in this course, I ...” was followed by the achievement goal items. Concerning performance goals, as students in individual feedback processes strive to appear as competent as possible/avoid appearing incompetent instead of comparing themselves with others, we specifically focused on the appearance component of this goal type. Thus, the goals assessed

include learning (approach) goals (e.g., “... want to keep improving my competences.”;  $\omega_{McDonalds} = .92$ ), appearance approach goals (e.g., “... want to be perceived as competent.”;  $\omega_{McDonalds} = .88$ ), appearance avoidance goals (e.g., “... do not want to be perceived as incompetent.”;  $\omega_{McDonalds} = .92$ ), and work avoidance goals (e.g., “... want to do as little as possible.”;  $\omega_{McDonalds} = .92$ ).

**Self-efficacy for revision.** Self-efficacy for revision was assessed after students read their feedback at each measurement point using an adapted version of the MSLQ scale (Pintrich, 1991), resulting in three items on a 5-point Likert-scale from *do not agree* to *fully agree* (e.g., “I am able to resolve even the difficult and strenuous parts of the revision of my work.”;  $\omega_{McDonalds} = .86$ ).

**Achievement emotions.** For measuring achievement emotions after reading the feedback, we used two items each (adapted from AEQ, Pekrun et al., 2002) with a 5-point Likert-scale from *do not agree* to *fully agree*. We assessed joy (e.g., “Reading my feedback, I felt joy.”;  $r_s = .89$ ), pride (e.g., “Reading my feedback, I felt pride.”;  $r_s = .91$ ), shame (e.g., “Reading my feedback, I felt shame.”;  $r_s = .88$ ), and anxiety (e.g., “Reading my feedback, I felt anxiety.”;  $r_s = .85$ ).

**Perceived usefulness.** We measured perceived usefulness on an adapted scale from Dickhäuser et al. (2007) with 4 items on a 5-point Likert-scale from *do not agree* to *fully agree*, e.g., “With this feedback, I am getting better at doing the assignments.” ( $\omega_{McDonalds} = .86$ ).

### 2.2.2. Operationalization of feedback use

We examined three aspects of feedback use:

**Amount of feedback use.** Right before revision, students reported how much they plan to use their feedback to revise their assignment (“To which extent are you going to revise this assignment based on the feedback?”; 7-point Likert-scale from *not at all* to *very extensively*). This measure encompasses the student perspective on the quantitative amount of their feedback use during the revision, not to be confused with how much they revise their assignment in total (e.g., also based on researching additional literature).

**Degree of change.** We compared the similarity between students’ first submission and their revision on a word basis using Jaccard-Similarity (Jaccard, 1902), using the package `jaccard.similarity{texreus}` in R (Mullen, 2020). This continuous measure shows the extent to which the assignment changed through an objective lens, consisting of a number between 0 (both versions are completely different) to 1 (both versions are identical).

**Quality improvement of assignment.** Next to the measures focusing on quantitative aspects, we also asked the students about qualitative changes after they finished their revision (“In your opinion, how much did the quality of your work improve by implementing this feedback?”;

7-point Likert-scale from *not at all* to *very much*).

2.3. Analyses

To test our hypotheses regarding the connections between motivational aspects, emotions, and feedback use, we estimated two-level path models in R (package lavaan, Rosseel et al., 2023) with measurement points on level 1 and individual students on level 2. Based on Monte Carlo studies by Bell et al. (2008), calculating multilevel models was determined to be appropriate for our longitudinal data structure. We chose two-level path modeling to account for our longitudinal data structure and focused on the level 2 results, as our research questions are directed at between student differences in how motivation is connected to feedback perceptions and use.

The model was estimated in line with the model displayed in Fig. 1, i. e., feedback use regressed on all other variables and emotions and perceived usefulness regressed on both achievement goals and self-efficacy. We tested for potential statistical mediation effects of goals and self-efficacy on the outcome variables via perceived usefulness by including indirect effects in our path model. Correlations between goals, emotions, and the three outcome variables were allowed. The relatively few missing values (<1%) were handled through Full Information Maximum Likelihood (FIML), and multiple linear regression was used as an estimator to control for deviations from normal distribution. Model fit was gauged using the guidelines by Hu and Bentler (1999), with CFI and TLI values  $\geq .95$ , and RMSEA and SRMR values  $\leq .08$  indicating an optimal fit. To check for robustness, we calculated an additional model solely for the first timepoint (see Table S4 in supplementary material).

Students received points for their assignments (for their first submission and, adding to this, for revising their texts), contributing to their course grade. However, students did not receive any scores for an assignment until after each revision was done and only received a combined score for the entire assignment, not broken down into first submission and revision. To consider the potential impact of the scores awarded to earlier assignments on students' revision, we included scores as a control variable.

3. Results

3.1. Descriptive results

The descriptive results (Table 1) show relatively high means for learning goals for the assignments, and lower means, but still over the theoretical mean of the scale, for performance goals, work avoidance goals, and self-efficacy. Positive emotions (joy, pride) emerged as being more prevalent than negative emotions (shame, anxiety) after students read their feedback. Concerning the correlations, all three outcome variables were correlated with goals, self-efficacy, and/or emotions.

3.2. Path modeling

To test our hypotheses, we conducted a two-level path model with indirect effects, interpreting the between student results. The model fit was acceptable:  $\chi^2(df = 15, n = 134) = 1527.687; p < .001$ ; CFI > 0.99; TLI > 0.99, RMSEA < 0.01; SRMR<sub>within</sub> = 0.01; SRMR<sub>between</sub> = 0.09. The results are summarized in Fig. 3 (full between-level results: see Table S3 in the supplementary material).

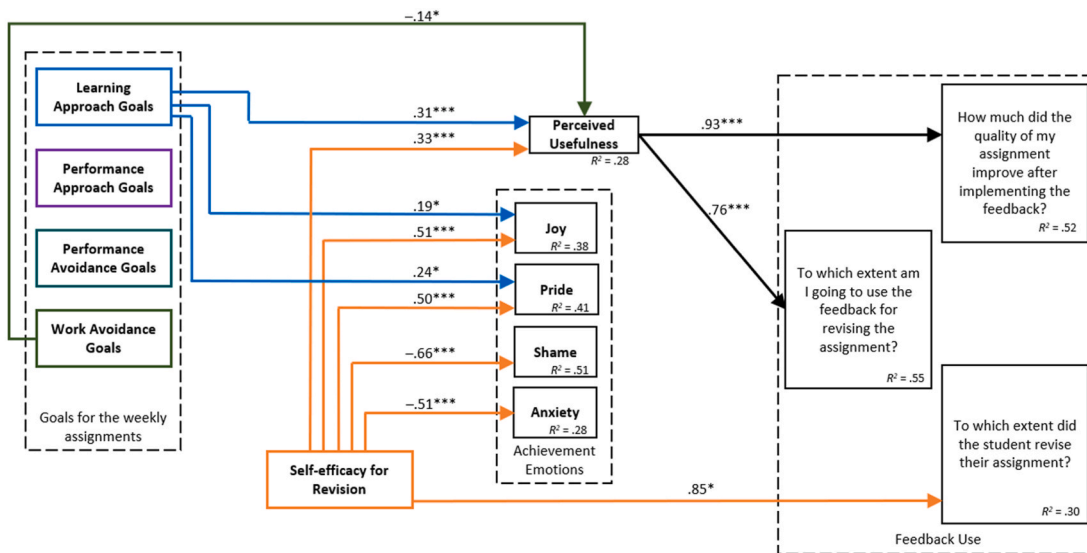
Concerning H1 (relationship between achievement goals and perceived usefulness), learning goals were positively associated and work avoidance goals were negatively associated with perceived usefulness of feedback. Additionally, learning goals were positively associated with joy and pride. These associations are in line with our expectations (H2), however, no further statistically significant associations between any of the achievement goals and the four emotions were identified.

H3, which focused on the expected associations between

Table 1  
Descriptive statistics and bivariate correlations.

	Descriptives				Bivariate correlations												
	M	SD	Min	Max	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Achievement goals																	
[1] Learning	6.90	1.03	2	8													
[2] Performance approach	4.52	1.59	1	8	.18*												
[3] Performance avoidance	4.96	1.86	1	8	.15*	.71***											
[4] Work avoidance	4.34	1.63	1	8	-.32***	-.01	.09										
[5] Self-efficacy for revision	3.80	0.70	1.7	5	-.02	.08	-.05	.06									
[6] Perceived usefulness	3.29	0.81	1.3	5	.31***	.19**	.12	-.18*	.26***								
Emotions when receiving feedback																	
[7] Joy	3.39	0.81	1.2	5	.18**	.17*	.14	-.11	.42***	.46***							
[8] Pride	3.36	0.84	1	5	.16*	.25***	.20**	-.02	.43***	.34***	.79***						
[9] Shame	1.46	.67	1	4.5	-.06	.11	.17**	.02	-.49***	-.12	-.29***	-.32***					
[10] Anxiety	1.67	.80	1	5	-.02	.01	.09	-.04	-.43***	-.09	-.24***	-.25***	.74***				
Feedback use																	
[11] Self-reported amount of feedback use	3.88	1.15	1.3	6.5	.21***	.06	.02	-.22***	-.15*	.36***	-.19**	-.26***	.20**	.22***			
[12] Degree of change	.75	.23	0	1	-.05	.09	.13	.06	.14	-.12	.22***	.25***	-.04	-.07	-.23***		
[13] Self-reported improvement	2.98	0.78	1	4.3	.22**	.16	.01	-.09	.02	.58***	.11	.04	.05	-.03	.49***	-.23***	
Assignment score	15.6	1.67	10	18	-.07	.13	.12	.10	.41***	.14	.45***	.44***	-.36***	-.26***	-.27***	.38***	.01

Note. N = 182. Displayed are the descriptive statistics and manifest, bivariate correlations on the between student level. Statistically significant correlations at the  $p < .001$  level are marked with \*\*\*,  $p < .01$  with \*\* and  $p < .05$  with \*.



Note.  $N = 483$  observations from  $m = 182$  students. Depicted are standardized regression weights. Regressions that are statistically significant at the  $p < .001$  level are denoted by \*\*\*,  $p < .01$  by \*\* and  $p < .05$  by \*. Our model showed an acceptable fit:  $\chi^2(df = 15, n = 134) = 1527.687$ ;  $p < .001$ ; CFI  $> .99$ ; TLI  $> .99$ ; RMSEA  $< .01$ ; SRMR<sub>within</sub> = .01; SRMR<sub>between</sub> = .09. In this figure, we show level 2 results, as our research questions are directed at individual differences between students. For clarity, only statistically significant relations are shown, and correlations are included but not depicted. Final scores were included as control variables. Unstandardized regression weights of total score:  $\beta = .19$  (n.s.) for amount of revision,  $\beta = -.17^*$  for degree of change, and  $\beta = -.27$  (n.s.) for quality improvement through revision.

**Fig. 3.** Results of Two-level Path Modeling with Achievement Goals, Self-efficacy, Achievement Emotions, Perceived Usefulness, and Aspects of Feedback Use On the Between Student Level

Note.  $N = 483$  observations from  $m = 182$  students. Depicted are standardized regression weights. Regressions that are statistically significant at the  $p < .001$  level are denoted by \*\*\*,  $p < .01$  by \*\* and  $p < .05$  by \*. Our model showed an acceptable fit:  $\chi^2(df = 15, n = 134) = 1527.687$ ;  $p < .001$ ; CFI  $> .99$ ; TLI  $> .99$ ; RMSEA  $< .01$ ; SRMR<sub>within</sub> = .01; SRMR<sub>between</sub> = .09. In this figure, we show level 2 results, as our research questions are directed at individual differences between students. For clarity, only statistically significant relations are shown, and correlations are included but not depicted. Final scores were included as control variables. Unstandardized regression weights of total score:  $\beta = .19$  (n.s.) for amount of revision,  $\beta = -.17^*$  for degree of change, and  $\beta = -.27$  (n.s.) for quality improvement through revision.

achievement goals and the use of feedback in revision, was not directly supported in our model, as no statistically significant direct associations between achievement goals and any of the outcome variables emerged. However, there were statistically significant indirect effects of learning goals on self-reported revision and improvement via perceived usefulness of feedback (revision:  $\beta = .24$ ,  $p = .004$ ; improvement:  $\beta = .28$ ,  $p = .002$ ), showing a statistical mediation effect of learning goals on self-reported revision and quality improvement via perceived usefulness. Work avoidance goals were negatively associated with perceived usefulness but did not show any significant indirect effects on feedback use. Performance approach and avoidance goals did not show any effects on feedback perception or use.

Self-efficacy for revision was strongly associated with perceived usefulness (H4) and with all assessed emotions (H5). As expected, self-efficacy was found to have positive associations with joy/pride (positive emotions) and negative associations with shame/anxiety (negative emotions). It was also positively associated with how useful students perceived the feedback. Moreover, self-efficacy was strongly and positively associated with the degree of change students made in their revision compared to their first submission, but not with the self-reported dimensions of feedback use (H6), and showed indirect effects on self-reported amount of revision via perceived usefulness ( $\beta = .25$ ,  $p = .005$ ). None of the four emotions emerged as predictors of any of the dimensions of feedback use (H8), while perceived usefulness was consistently and strongly associated with the self-reported dimensions of feedback use, supporting H9.

## 4. Discussion

### 4.1. General discussion

The main purpose of this study was to examine how motivation, i.e.,

achievement goals for the assignment and self-efficacy for revision as value- and expectancy-based aspects, matter for students' feedback perception and use, as those motivational theories seem suitable to answer some of the open questions in the field of students' feedback perceptions and use in higher education. We investigated how these motivational aspects relate to the achievement emotions feedback elicits, to how useful students perceive the feedback to be, and how these factors explain whether students use feedback in revising their assignments in a large higher education course. Within this, we captured feedback use by combining self-reported and more objective measures looking at both total change and improvement of quality to achieve a broader picture of students' feedback perception and use. This study was conducted within an authentic setting, contributing to high ecological validity.

Our results are in line with our theoretical assumption that aspects of students' motivation affect how they perceive their feedback and how they use it. Firstly, students striving to broaden their competence (i.e., strong learning goals), as well as students who were confident in their ability to revise their assignment (i.e., high self-efficacy for revision) perceived their feedback as more useful. Students who aimed to have as little work as possible in the tasks (i.e., strong work avoidance goals) perceived the received feedback as less useful. This pattern of linkages corroborates the early theorizing of Dweck (Elliott & Dweck, 1988), suggesting that learning goals lead to more favorable reactions to (negative) feedback. Following this, students who pursue learning goals may see remarks about weaknesses in their assignment as opportunities to learn from their errors and thus as helpful for reaching their goals.

Secondly, how useful students perceived the feedback they received to be was consistently and strongly associated with both qualitative and quantitative dimensions of feedback use, emerging as the most important predictor of how students used feedback in our model. This is in line with the claims made by Jonsson and Panadero (2018), who identified



perceived usefulness as one of the main elements for students' feedback use. With perceived usefulness of the feedback as a part of its utility value (Eccles & Wigfield, 2020), this central role of perceived usefulness illustrates the key role task value plays for successful task performance, particularly regarding the task of using feedback for revision. Notably, students who perceived their feedback as useful both changed their assignment more and saw more quality improvement, implying that usefulness encompasses both quantitative and qualitative aspects. As learning goals, work avoidance goals, and self-efficacy for revision were found to be connected to whether students perceived their feedback as useful, this points to a great significance of favorable motivation (i.e., strong learning goals and high self-efficacy for revision) for successful feedback intake.

Furthermore, self-efficacy for revision and learning goals for the task were linked with students' amount of feedback use, mediated by perceived usefulness. Moreover, students holding higher self-efficacy beliefs for revising their task implemented significantly and drastically more changes than students holding lower self-efficacy beliefs. This finding adds to the few prior studies that have investigated effects of self-efficacy on feedback-related behavior, adding a new dimension: Students with higher self-efficacy for revision do not only seem to spend more time reading their feedback (Winstone, Nash, Parker, & Rowntree, 2017) and be more interested in it (Duijnhouwer et al., 2012), but also use the feedback to change their work more extensively than students with lower self-efficacy for revision. However, it seems puzzling that these findings did not extend to the qualitative dimension of feedback use, as self-efficacy for using feedback effectively should not be only directed to quantitative aspects, but also to the quality of writing. However, self-efficacy showed indirect effects on qualitative changes via perceived usefulness. This implies that students with strong self-efficacy beliefs generally poured more effort into their revision, but, in their eyes, this effort was only adding to the quality of their work when they received useful tips on how to improve in their feedback.

Concerning the theoretical bidirectional relationship between self-efficacy and feedback, this finding emphasizes that, aside from feedback shaping self-efficacy, self-efficacy also shapes how feedback is used. Considering that this latter viewpoint has received little empirical attention, while the direction of feedback influencing self-efficacy is rather well studied, this result is an important addition to research on the bidirectional associations between self-efficacy and feedback (Panadero et al., 2023).

Thirdly, students' learning goals and self-efficacy were positively linked to feeling joyful and proud after reading the feedback, and students' self-efficacy was negatively linked to feeling ashamed or anxious after reading the feedback. For self-efficacy, this fits with prior research in other academic domains (Putwain et al., 2013) and aligns with our expectations. Based on meta-analytic results (Huang, 2011), the positive linkages between learning goals and experiences of joy and pride were expected, however, we also expected additional negative linkages between learning goals and shame and anxiety while reading the feedback and linkages with performance or work avoidance goals. For example, students who try to avoid looking incompetent in their assignments would have been expected to experience more shame or anxiety when reading feedback containing criticism compared to students who care less about looking incompetent.

Given that students' achievement goals can change over time to a certain degree (Fryer & Elliot, 2007; Muis & Edwards, 2009), the goals measured early in the semester might rather be a rough estimate for the achievement goals pursued in later measurement points. Even though Cron et al. (2005) also did not find significant relations between students' goals and the intensity of negative emotional reactions to feedback, we would still expect achievement emotions to be connected to achievement goals based on previous research (e.g., Huang et al., 2011). Additionally, achievement goals were relevant for how positive people reacted to feedback and as how useful they perceived it in earlier studies (Anseel et al., 2011; Rakoczy et al., 2013), thus, these effects need to be

clarified in further studies. Within those, it would be particularly interesting to consider the course of goals over the semester.

We expected achievement emotions to be directly related to how feedback is used, as emotional reactions to feedback can be expected to be intertwined with cognitive processes on how to use it (Dowden et al., 2013), e.g., with the use of learning strategies (Obergrösser & Stoeger, 2020). Generally, control-value theory suggests that joy, pride, shame, and anxiety are activating emotions that influence learning behavior of students after they receive achievement-related outcomes like feedback (Pekrun, 2000). However, we did not find any linkages to support this claim. Looking at the situated context of receiving feedback, the missing effects might stem from the intertwining with the feedback valence. Illustrating this issue with the example of joy, joy is an achievement emotion that overall carries positive effects on learning. However, if students receive very positive feedback on their submission with barely any suggestions on how to improve, they likely experience joy, but likely also do not change much in their submission as it seems to be sufficient. Thus, joy could both be an emotion that supports feedback use or an emotion going along with barely using feedback. Similarly, negative activating emotions might lead to ambivalent effects (Pekrun, 2006).

Additionally, as students were free to access the learning management system at any time, they might not have revised their work right after reading their feedback but stretched the revision over several days. This way, their achievement emotions might not always have prevailed until students actually started using the feedback, leading to the missing link in our findings. In this light, the question of how emotions that arise during feedback processes might trigger motivated action (Lipnevich et al., 2021) to use feedback requires further investigation.

#### 4.2. Limitations and future directions

Some limitations should be considered when interpreting the results of our study for future research to build on. First, our study was conducted in an authentic setting in a higher education course. This required reducing the number of items used in each survey, however, we measured our constructs of interest three times in three parallel measurement points across one semester. For this reason, achievement goals were only measured once early in the semester. The distance between goal assessment and feedback instances might have therefore masked effects of achievement goals on emotions, feedback perception, and use, making it more difficult to detect them. By implication, the effects we found for learning goals and work avoidance goals should be robust, as supported by our additional analysis for timepoint 1 (see Table S4 in the supplementary material). The robustness of our results furthermore illustrates that our slightly higher than ideal SRMR<sub>between</sub> should not be an indicator of problematic model fit.

Thus, the effects of achievement goals should be revisited with goals measured in a timelier manner. Within this, it might be fruitful to also differentiate perceived usefulness regarding different goals for which the feedback could be helpful to generate clearer results.

Due to the authentic setting, we also did not experimentally manipulate students' motivation, but measured existing individual differences. Thus, the detection of causal effects of motivational aspects on the extent of how students used the feedback to revise their assignments is not possible.

Generally, the students in our course largely pursued learning goals for the assignment and were rather confident about being able to implement the feedback they received, i.e., they reported high self-efficacy for revision at each of the measurement points. Taken together, this suggests a high baseline motivation of students in the sample. As nearly all students participating in this course also participated in our study, with nearly all of the students in the respective program and cohort participating in this course, this prevalence of favorable motivation does not suggest strong distortion of our data. Nevertheless, this could lead to potential underestimation of effects in our sample.

Another important point of discussion is the operationalization of feedback use in our study. In addition to student-reported criteria, we used one objective measure, namely the degree of feedback use, by comparing the first submission with the revision in a computer-based way to illuminate the degree of change students made. Conducting post-hoc text analyses to gauge feedback use, however, has been criticized in past works (Van der Kleij & Lipnevich, 2021). Furthermore, this measure was exclusively quantitative, so it is blind to how much the content of the assignments changed and how much the quality of the assignments improved after using the feedback for revision. However, we compensated for this by including both a quantitative and a qualitative dimension of feedback use that was student-reported. Building on this, an interesting avenue for future research would be to find ways to measure feedback use both qualitatively and in an objective way while maintaining efficiency for larger samples, like in our study.

From a more general perspective, the question of how feedback influences achievement goals and self-efficacy over time needs to be incorporated into future studies with similar longitudinal designs, as both motivational aspects are theorized to be subjected to change by feedback (Bandura, 1997; Senko & Harackiewicz, 2005). This might paint a more detailed picture of the interplay between feedback processes and motivational aspects. Within this, it would be worthwhile to consider the bidirectionality-hypothesis (Panadero et al., 2023), analyzing how, for example, repeated incorporation of tutor feedback is linked to self-efficacy for revision, and how this self-efficacy for revision in turn influences the incorporation of tutor feedback.

Within such longitudinal designs, it might also be fruitful to look into within student differences, taking into account feedback valence and feedback quality. Other than this study, with only three measurement points that do not capture within student changes with the necessary fine-grained focus, such longitudinal studies would need more measurement points to allow for proper within student interpretation and for capturing the dynamics of motivational changes.

Furthermore, it might be interesting to explore how perceived usefulness of feedback influences the value students attribute to feedback in the long term and how this affects future feedback use, according to expectancy-value theory.

Overall, it might be interesting to explore different contexts. For example, students might not care as much about a tutors' opinion in a single course compared to feedback given by a bachelor thesis supervisor (Lee, 2008), and performance goals or achievement emotions might be more meaningful in verbal, face-to-face feedback. Particularly the role of achievement emotions and feedback use warrants deeper investigation. These possible moderators should be investigated in future studies.

### 4.3. Conclusion

In conclusion, the results of this study support the notion that motivational factors, i.e., students' achievement goals and self-efficacy, are meaningful for how students perceive feedback, how they emotionally react to it, and how they eventually use it to revise their works. In particular, self-efficacy both directly and indirectly predicted feedback use. Furthermore, learning goals and self-efficacy showed explanatory value for the emotions experienced when receiving feedback and, together with work avoidance goals, for perceived usefulness of the feedback, which in turn predicted feedback use on different dimensions. Within this, the unexpected missing findings for performance goals suggest a need for further exploration of the relationship between achievement goals and feedback perception and use. The subjective relevance of the feedback giver might be a relevant moderator for future research on how achievement goals shape feedback perception and use.

With the limitations of this study in mind, the results of our study lay a foundation for successful feedback practices in higher education: Students need to feel competent to revise their assignments in order to feel good about their feedback, and use it extensively, and students who

want to improve their competences rather perceive instructor feedback as more useful. Thus, instructors should focus on fostering students' self-efficacy for revision (e.g., by providing scaffolds; Moos & Azevedo, 2008) to avoid negative emotional experiences when receiving feedback and to support them in deeming it helpful. Furthermore, it is crucial to communicate the potential advantages of feedback to students, thereby offering them an understanding of the value of the feedback they receive.

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The authors have no known conflicts of interest or competing interests to declare.

### Research data

Will be made accessible after an embargo period. If necessary, we are going to share our material upon request.

### Authors statement

All authors approved of this version of the manuscript for publication.

### CRediT authorship contribution statement

**Melanie V. Keller:** Writing – review & editing, Writing – original draft, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Markus Dresel:** Writing – review & editing, Supervision, Resources, Project administration, Methodology. **Martin Daumiller:** Writing – review & editing, Supervision, Project administration, Methodology, Conceptualization.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.learninstruc.2024.101948>.

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