# Feedback perceptions and attributions in three feedback conditions

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**Abstract**

Feedback is an important factor in student performance. This study examines the relationship between feedback types, student perceptions, students' causal attributions and willingness to improve according to feedback. Constructs were measured using previously validated instruments. The Feedback Perception Questionnaire (FPQ) was used to examine students' perceptions and the Revised Causal Dimension Scale (CDS - II) was used to examine causal attributions. Participants are first and second year students of the Biology and Medical Laboratory Research (BML) bachelor's program at Hogeschool Rotterdam ($n$ = 195). Students received formative feedback, summative feedback or mixed feedback. The expected direct relationship between the feedback groups and the students' willingness to improve their performance according to the feedback was not found in this study. It was therefore not possible to test for mediating roles of both students' feedback perceptions and students' causal attributions, respectively. This study was, however, able to find evidence for a direct relationship between students' feedback perceptions and students' willingness to improve their performance. Evidence for a relationship between students' causal attributions and their willingness to improve their performance was also found.

*Keywords:* feedback, summative feedback, formative feedback, feedback perception, causal attribution, higher education.

## Introduction

Feedback is present in just about every conceivable learning situation, in a large variety of forms. Within higher education, teacher feedback especially plays a prominent role. Higgins and Hartley (2002) warn that students, especially when faced with high workloads, may disregard feedback that is not of direct use to them. Since giving elaborate and "good" feedback can be a very time consuming activity for teachers, these situations can be a loss for both teachers and students. As such it is of vital importance that more insight is gained on what feedback is used and what feedback is disregarded. After establishing the relationship between feedback and student performance this paper will discuss formative and summative assessments. Feedback perceptions will be discussed as well as feedback in the context of attribution theory.

### The relationship between feedback and student performance

In a synthesis comprising 134 meta-analyses, Hattie (2013) made an attempt to identify every possible influence on student performance. Feedback emerged to be a major influence as it provides a clear view of both current and desired levels of mastery of anything that is being studied (Clark, 2012). Feedback also serves to adjust the learning process where necessary (Nitko & Brookhard, 2011) and diminishes the gap between the current and desired situation (Hattie & Timperley, 2007; Sadler, 1989). Test feedback is an important factor for helping students identify their own strong and weak points, as well as improving their results and motivation (Hyland, 2000).

According to Hattie and Timperley (2007) feedback is only effective when it answers three main questions, being (1) "Where am I headed?" (2) "Where am I now?" and (3) "Where to go next?". These questions all refer to the student's position within a learning process and are labeled (1) Feed up, (2) Feedback and (3) Feed forward. Feed up contains information about how to reach learning goals as related to the task or the performance at hand. Feedback is primarily important in terms of students' self-assessment and evaluation. Feed forward, then,

provides information regarding the possibilities to improve or reinforce a student's learning strategies. When the current position within a learning process and the steps needed to reach learning goals are clear to students, learning becomes more effective (Carless, 2006).

Feed up, feedback and feed forward are all operating on four levels, being task level, process level, self-regulation level and self-level (Hattie & Timperley, 2007). The task level concerns how well tasks are comprehended and executed. The process level maps the steps a student needs to take in the learning process to perform the current task. The self-regulation level centers on self-monitoring and regulating all task-related actions. Lastly, the self-level is focused on personal evaluation and the (often positive) consequences of the learning process on the student (Hattie & Timperley, 2007).

Constructive feedback is important for students, as it catalyzes learning in courses (Gibbs & Simson, 2004) and, provided feedback is clear and relevant, contributes to the process of lifelong learning (Fyfe, Meyer, Fyfe, Plastow, Sanders & Ziman, 2006). The effectiveness of this feedback is related to three key elements, being the perception of the feedback, its impact and its credibility (Poulos & Mahoney, 2008). Feedback impact and credibility have been found to be closely related to student perceptions of the feedback provider. These perceptions are influenced by student emotions and vice versa. This combination of influences then affects the effectiveness of feedback (Strijbos, Pat-El & Narciss, 2010; Fyfe, Fyfe, Meyer, Ziman, Sanders & Hill, 2014).

**Feedback in summative and formative assessments**

Summative assessments are used to determine what students know and what they don't know. Summative assessment is a way to assess student learning relative to the content standards; students show they have achieved competence in a certain task (Garrison & Ehringhaus, 2007). Summative assessment usually takes place at the end of a course or module. Because it takes place at the end of the learning process, summative assessment usually comes too late to make useful adjustments to instruction. (Harrison, Könings, Molyneux, Schuwirth,

Wass, & van der Vleuten, 2013). Formative assessment, on the other hand, is an integral part of the instructional process. It provides the student or teacher with information that can be used to adjust the learning process while it is happening (Garrison & Ehringhaus, 2007). Thus, it is able to make valuable improvements to a student's learning process.

Summative assessments are important moments in the lives of students (Carless, 2006). Students spend a lot of time and effort working on their assignments and studying for their tests. Because of this, teacher evaluations of this work are held in high regard by the students (Higgins, Hartley & Skelton, 2001). All the invested effort make that the general process of grading and evaluating student performance is a very emotional process for these students (Boud, 2013). Negative emotions may hinder students in learning from the feedback they have received from their teachers. Performance-related feedback is personal information concerning the student, which can make it difficult for these students to objectively process this kind of information. Because feedback can be very personal, receiving feedback is a highly emotional process that influences the self-esteem and pride of a student (Ashford, Blatt & VandeWalle, 2003). A positive emotional response that may be triggered by any form of assessment can help a student in the learning process, while negative emotional responses may block the student and their progress (Taras, 2001). Emotional responses also affect the quality of ongoing reflective processing, because processing emotions will take up some of the limited cognitive resources at the student's disposal (De Rue & Wellman, 2009; Van Woerkom, 2008).

Formative assessment may cause less of an emotional reaction because the stakes are not as high as in a summative feedback setting. Formative assessment is most useful when it provides specific feedback about errors and suggestions for improvement rather than just providing the student with the right answers (Boston, 2002). This kind of feedback may be especially helpful to lower achieving students because it emphasizes the possibility for students to improve with the right effort rather than blaming low achievements on some innate lack of ability (Boston, 2002). By pointing out possibilities for improvement formative assessment can

stop students from attributing their poor performances to a lack of ability and helps them to stay in control of their learning process.

**Feedback perceptions**

Received feedback will not always be accepted as it is and will not always be used by students (Sargeant, Mann, Sinclair, Van der Vleuten & Metsemakers, 2008). When feedback matches the self-perception of the student, the feedback will primarily generate positive emotions. However, students will see little need to adjust their behavior in any way. In other words, the feedback perception may affect students' willingness to improve and their affect (emotional state), which may subsequently influence their performance (Strijbos et al., 2010).

Feedback containing specific directives in order to improve learning generates little emotions and will generally be used in order to improve performance (Sargeant et al., 2008). Feedback that does not match the student's self-perception may cause students to have long lasting negative emotions as well as self-reflection regarding both these emotions and the received feedback. When these emotions get processed properly, the students may still learn from their feedback, although they do not consider it easy to adjust their behavior accordingly (Gielen, Dochy & Frederick, 2003; Mory, 2004). Students who are failing to adjust their behavior according to the feedback often feel a sense of unfairness regarding the feedback procedure and the feedback provider. It may also be unclear to them how their behavior can be adjusted. Another possibility is that the students consider the feedback they received to be inconsistent with earlier performance-related evaluations and will therefore not act on the feedback (Sargeant, Mann & Ferrier, 2005; Evans, Elwyn & Edwards, 2004).

Feedback is not interpreted the same way by every student; feedback that is perceived to be a helpful suggestion to one student, may be seen as a personal attack by another (Carless, 2006). Some students use feedback as a way of building their confidence rather than as a way to correct a knowledge or skill deficiency (Eva, Armson, Holmboe, Lockyer, Loney, Mann & Sargeant, 2012). Higher performing students appear to use feedback more as a positive

affirmation rather than for adjusting their learning process. Poorer performing students, who are arguably most in need of feedback are often least engaged (Harrison, et al., 2013). Feedback perception may also be predictive of the students' willingness to improve their performance as well as affect (Strijbos et al., 2010).

**Feedback and attribution theory**

Within the model for feedback acceptance and the use of feedback as given in testing situations, attribution theory plays a key role. Attribution theory focuses on the causes to which students attribute their successes or failures, be it in the academic field or anywhere else. There are three dimensions to be considered within attribution theory, being (1) the locus of the cause, (2) the stability of the cause and (3) the controllability of the cause (Weiner, 2001; Weiner, Nierenberg & Goldstein, 1976). It is of great importance to know what students view as the causes for whatever feedback they are being given, when assessing how aforementioned feedback is being put to use by the students. For instance, feedback, whether predominantly positive or negative, can be attributed to external processes that have nothing to do with the student himself. Examples are 'blaming' bad luck or the instructor for negative performances. The causes for the feedback as has been given can also be seen as uncontrollable – luck is not something you control – and can also be perceived to be unchanging or stable over time. These conditions greatly discourage students from undertaking any effort to improve their situation, which means they won't be using the feedback given to them to improve their performance. This is because people are more likely to perceive causal relationships between their behavior and success than between their own behavior and (constant) failure (Zuckerman, 1979). These attributions can also cause students to become apathetic or cause them to feel helpless, or actually more motivated to improve next time (Graham, 1991). Understanding what students attribute the received feedback to will help greatly in assessing their willingness to improve their work or practices when confronted with feedback.

**Research questions**

The main research questions of this study address several possible relationships between feedback conditions, feedback perceptions, causal attributions, and students' willingness to improve their performance according to feedback (see Figure 1). Does students' willingness to improve differ between groups where the feedback was mostly formative, mostly summative or a mix of feedback types? Secondly, do other feedback perception constructs such as the perceived fairness, usefulness and acceptance, as well as an affective perceptive factor play a mediating role between feedback conditions and the willingness to improve? Similarly, do causal attributions as made by students in regard to the feedback play a mediating role between the feedback conditions and the student's willingness to improve according to feedback? These causal attributions are subdivided into students' perceived locus of causality, personal control and external control and the perceived stability of the situation. Thirdly, do feedback perceptions (acceptance, affect, fairness, and usefulness) predict a student's willingness to improve their performance? Fourthly, do students' causal attributions (external control, locus of causality, personal control, and stability) predict a student's willingness to improve? Lastly, is there a relationship between the kind of feedback the students receive (formative, summative, or mixed) and their perceptions of the feedback as well as their causal attributions?

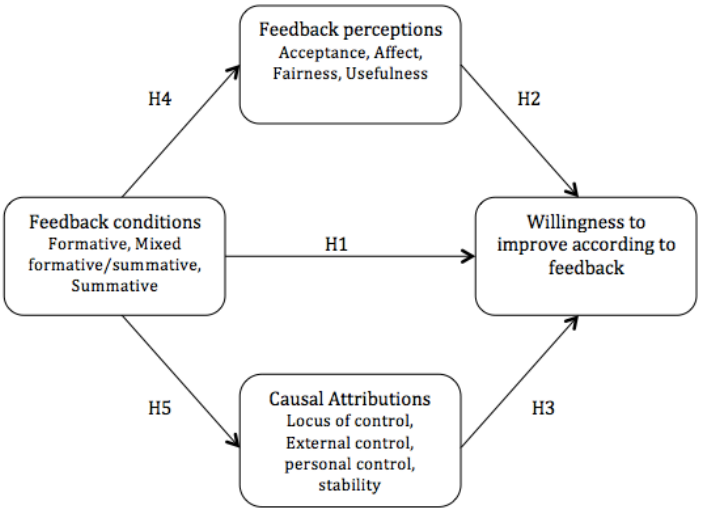


*Figure 1*. Graphical display of the different variables and hypothesized relationships.

Looking at the possibility of a mediating role of feedback perception, as the primary goal of formative feedback is to improve learning while summative feedback is mostly used for making selective decisions, it is expected that a direct relationship between feedback types and students' willingness to improve their performance exists (Hypothesis 1).

Secondly, in accordance with research by Strijbos et al. (2010) a relationship between students' feedback perceptions and their willingness to improve their performance according to feedback is expected (Hypothesis 2).

Students' causal attributions are also expected to be related to students' willingness to improve their performance (Hypothesis 3), as causal attributions that focus on forces outside of the student and their control, as well as causal attributions that concern factors that are (perceived to be) stable or unchanging over time have been found to initiate little action from the student's side (Sorić & Palekčić, 2009).

Feedback types are expected to be related to students' feedback perceptions. Feedback groups are expected to vary in their measure of acceptance, affect, fairness and perceived usefulness of feedback (Hypothesis 4). Because of its lack of a selective function, formative feedback is expected to be perceived differently than summative feedback, because the direct impact of formative feedback on students' lives is smaller.

Lastly, it is expected that feedback types are related to students' causal attributions. Feedback groups are expected to differ in their locus of causality, stability, external control as well as personal control (Hypothesis 5). Because of its focus on learning and improving performance students who received formative feedback are expected to have different causal attributions than students who received summative feedback.

## Method

### Participants

The participants in this study are 130 first-year students and 65 second-year students from the Hogeschool Rotterdam. The participants are all students in a four-year Biology &

Medical Laboratory Research bachelor's program. The mean age of the participants is $M$ = 20.41, $SD$ = 3.30. The students are enrolled in three different courses: PPU31, INF11 and MBT11. Each course represents a different feedback group in this study (see Table 1).

The summative feedback group consists of 130 students (45 male, 84 female) from the PPU31 course. PPU31 is a first-year project-based course about the human DNA. Students in the PPU31 course receive a grade accompanied by short written feedback on their work. The mean age of the students in the summative feedback group is $M$ = 19.65 years, $SD$ = 3.30.

The mixed feedback group consists of 30 students (10 male, 20 female) from the MBT11 course. MBT11 is a second-year course about molecular biological theory. Students in MBT11 receive feedback on a research plan. This research plan should be sufficient to go ahead with the course (go / no go) but will not be graded. The mean age of the students in the mixed feedback group is $M$ = 22.07 years, $SD$ = 3.72.

The formative feedback group consists of 35 students (9 male, 26 female) from the INF11 course. INF11 is a second-year course about processing research data using Microsoft Excel. The students in the INF11 course receive feedback on voluntary assignments. The mean age of the students in the formative feedback group is $M$ = 21.97 years, $SD$ = 3.65.

Table 1.

*Feedback groups and characteristics.*

| Feedback group | Course name | *n* | *M* age | SD | Women | Men |
|---|---|---|---|---|---|---|
| Summative feedback | PPU331 | 130 | 19.65 | 0.25 | 84 | 45 |
| Mixed feedback | MBT11 | 30 | 22.07 | 0.69 | 20 | 10 |
| Formative feedback | INF11 | 35 | 21.97 | 0.65 | 26 | 9 |
| Total | | 195 | 20.41 | 3.30 | 130 | 64 |

**Instruments**

The participants were asked to complete a questionnaire (see appendix A) measuring their perceptions of the feedback they received during the courses, as well as their attributions concerning the feedback. The questionnaire is combination of a Dutch translation of the Feedback Perception Questionnaire (FPQ) complemented by questions concerning students' attributions of the feedback. Students' attributions are measured using the Revised Causal Dimension Scale (CDS – II), this scale was designed to assess how the attributor perceives the causes of an event (McAuley, Duncan & Russell, 1992).

*Feedback Perception Questionnaire*

The original FPQ was developed and validated by Strijbos, Pat-El & Narciss (2010), and measures students' perception of feedback in terms of fairness, usefulness, acceptance, willingness to improve and affect. Items are measured on a 10 cm bi-polar scale from 0 (fully disagree) to 10 (fully agree). Fairness, usefulness, acceptance and willingness to improve are each measured using three items while affect is measured using six items. Original FPQ questions were translated to Dutch and rephrased to reflect the participants' specific feedback situations. Negatively phrased items were recoded for analysis. Examples of items on each of the scales can be found in Table 2.

To guarantee the validity of the questionnaire a confirmatory factor analysis was performed to ensure results reflect the five factors of the FPQ. The factor analysis showed that the five factors explained 73.38% of the variance, a high percentage according to the COTAN standards (Evers, Braak, Frima & Vliet-Mulder, 2009-2011). The results from the factor analysis confirmed the original validation performed by Strijbos et al. (2010).

The reliability of the questionnaire was measured using Chronbach's Alpha. Four of the separate factors on the FPQ each have a high reliability; fairness has a reliability of $\alpha = .84$, usefulness has a reliability of $\alpha = .88$, affect has a reliability of $\alpha = .83$, willingness to improve has a reliability of $\alpha = .81$. Acceptance had a low reliability of $\alpha = .39$, and was therefore

excluded from analysis. The FPQ had an overall reliability of $\alpha = .91$. The results were in accordance with results from Strijbos et al. (2010); in the original validation acceptance also proved to be an unreliable scale.

Table 2.

*Examples of items on FPQ*

| Scale | Example items |
|---|---|
| Fairness | I consider this feedback justified.<br>I would consider this feedback fair. |
| Usefulness | I would consider this feedback helpful.<br>This feedback would provide me a lot of support. |
| Acceptance | I would dispute this feedback.<br>I would accept this feedback. |
| Willingness to improve | I am willing to invest a lot of effort in my revision.<br>I am prepared to use this feedback in later assignments. |
| Affect | I feel offended because I received this feedback on my assignment.<br>I feel frustrated because I received this feedback. |

*Revised Causal Dimension Scale*

The CDS – II was developed by McAuley, Duncan, & Russell (1992) to measure perceived causes of events. This scale determines attributions in terms of locus of causality, stability and controllability as described by Weiner (1979). Items are measured on a nine-point scale. Locus of causality, stability, controllability, external control, and personal control are each measured using three items. Items were translated to Dutch and rephrased to reflect the participants' specific feedback situations. Examples of items on each of the scales can be found in Table 3.

To guarantee the validity of the questionnaire a confirmatory factor analysis was performed to ensure results reflect the four factors of the CDS – II. The factor analysis showed that the four factors explained 64.83% of the variance, a high percentage according to the COTAN standards (Evers, et al., 2009-2011).

The reliability of the questionnaire was measured using Chronbach's Alpha. Three of the four factors of the CDQ - II had a reasonably high reliability. Locus of causality had a reliability of $\alpha = .68$, personal control had a reliability of $\alpha = .70$, external control had a reliability of $\alpha = .70$. Stability had a reliability of $\alpha = .58$, and was therefore excluded from the analysis. The CDQ - II questionnaire had an overall reliability of $\alpha = .66$.

Table 3

*Examples of items on CDS – II Questionnaire*

| Scale | Example items |
|---|---|
| Locus of causality | The feedback reflects:<br>An aspect of yourself (9 8 7 6 5 4 3 2 1) An aspect of the situation.<br>Something about you (9 8 7 6 5 4 3 2 1) Something about others. |
| External control | The feedback reflects something:<br>Over which others control (9 8 7 6 5 4 3 2 1) Over which others have no control.<br>Other people regulate (9 8 7 6 5 4 3 2 1) Other people cannot regulate. |
| Stability | The feedback reflects something:<br>Permanent (9 8 7 6 5 4 3 2 1) Temporary<br>Stable over time (9 8 7 6 5 4 3 2 1) Variable over time. |
| Personal control | The feedback reflects something:<br>You can regulate (9 8 7 6 5 4 3 2 1) You cannot regulate.<br>Manageable by you (9 8 7 6 5 4 3 2 1) Not manageable by you. |

**Design and procedure**

The participants were asked to complete a pen-and-paper questionnaire at the end of their respective courses, after they had received feedback and/or had completed their final exams. A pen-and paper questionnaire was preferred over an online questionnaire because of the practical difficulties of implementing a bipolar scale on a digital medium. Additionally, higher response rates were expected on a pen-and-paper questionnaire than on an online questionnaire. Before they received the questionnaire the students were briefed in terms of the research purposes as well as any ethical considerations such as anonymity. The students were allowed to ask questions to the researchers while completing the questionnaire to clear up any possible issues.

## Results

The first ANOVA analysis showed the students' willingness to improve did not differ significantly between any of the feedback conditions $F$ (2, 191) = .56, $p$ = .95, $\eta^2$ < .001 (see Table 4 for means and standard deviations per group).

Table 4

*Means of the students' willingness to improve in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 65.97 | 21.19 |
| Mixed feedback | 30 | 67.40 | 17.08 |
| Summative feedback | 130 | 66.36 | 17.34 |
| Total | 195 | 66.45 | 17.96 |

The regression model indicated that the students' feedback perception (affect, perceived fairness of feedback and perceived usefulness of feedback) explained 49.2% of the variance

($R^2$ = *.49, F* (3,184) = 59.32, $p < .001$). Fairness proved to be a significant predictor of the students' willingness to improve their performance ($\beta = .32$, $p = .001$). Usefulness also proved to be a significant predictor of the students' willingness to improve their performance in the model ($\beta = .46$, $p < .001$). Affect was not a significant predictor of the students' willingness their to improve their performance in this regression model ($\beta = -.07$, $p = .28$).

The students' causal attributions proved to be significant predictors of their willingness to improve their performance. The regression model explained 13.3% of the variance ($R^2 = .133$, $F = 9.30$, $p < .001$). Personal control proved to be a significant predictor of the students' willingness to improve their performance ($\beta = .35$, $p < .001$). External control also proved to be a significant predictor of the students' willingness to improve their performance in this regression model ($\beta = .14$, $p = .05$). Locus of causality did not prove to be a significant predictor of the students' willingness to improve in this regression model ($\beta = -.06$, $p = .96$).

Results from the ANOVA analysis indicated a significant difference in affect between the three feedback groups $F$ (2, 188) = 11.05, $p < .001$, $\eta^2 = .11$ (means and standard deviations per group can be found in Table 5). Tukey's HSD Post Hoc test showed the mixed feedback group differs significantly from the formative feedback group ($p = .04$) as well as from the summative feedback group ($p < .001$).

Table 5

*Means of the students' affect in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 53.91 | 21.73 |
| Mixed feedback | 30 | 42.59 | 18.88 |
| Summative feedback | 130 | 59.75 | 16.74 |
| Total | 195 | 56.14 | 18.93 |

No significant difference in terms of fairness was found between the three different feedback conditions $F$ (2, 192) = 1.47, $p$ = .232, $\eta^2$ = .02 (see Table 6 for means and standard deviations per group).

Table 6

*Means of the students' perceived fairness of feedback in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 65.75 | 18.06 |
| Mixed feedback | 30 | 58.67 | 18.36 |
| Summative feedback | 130 | 60.19 | 19.06 |
| Total | 195 | 60.95 | 18.83 |

The results of the ANOVA analysis showed no significant differences in the students' perceived usefulness of the feedback between the three feedback groups $F$ (2, 190) = 1.51, $p$ = .223, $\eta^2$ = .02 (see Table 7 for means and standard deviations per group).

Table 7

*Means of the students' perceived usefulness of feedback in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 61.13 | 22.81 |
| Mixed feedback | 30 | 52.30 | 23.83 |
| Summative feedback | 130 | 58.34 | 19.59 |
| Total | 195 | 57.89 | 20.93 |

The students' locus of causality differed significantly between the feedback groups $F$ (2, 187) = 8.87, $p < .001$, $\eta^2 = .09$ (See Table 8 for means and standard deviations per group). Tukey's HSD Post Hoc Test showed significant differences between all three of the feedback conditions. The formative feedback group differed significantly from the mixed feedback group ($p < .001$) and from the summative feedback group ($p = .02$). The mixed feedback group also differed significantly from the summative feedback group ($p = .03$).

Table 8

*Means of the students' locus of causality in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 6.17 | 1.23 |
| Mixed feedback | 30 | 4.83 | 1.22 |
| Summative feedback | 130 | 5.49 | 1.26 |
| Total | 195 | 5.50 | 1.30 |

The students' scores on external control differed significantly between the three feedback conditions $F$ (2, 188) = 5.425, $p = .01$, $\eta^2 = .05$ (see Table 9 for means and standard deviations per group). Tukey's HSD Post Hoc Test showed significant differences between the formative feedback group and the mixed feedback group ($p = .01$) as well as the formative feedback group and the summative feedback group ($p = .02$).

Table 9

*Means of the students' external control scores in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 4.55 | 2.05 |
| Mixed feedback | 30 | 5.63 | 1.11 |
| Summative feedback | 130 | 5.30 | 1.22 |
| Total | 195 | 5.22 | 1.42 |

The final ANOVA analysis indicated no significant differences between the feedback conditions in terms of the students' personal control scores $F$ (2, 192) = 1.44, $p$ = .24, $\eta^2$ = .01 (see Table 10 for means and standard deviations per group).

Table 10

*Means of the students' personal control scores in the three different feedback conditions.*

| Group | *n* | *M* | *SD* |
|---|---|---|---|
| Formative feedback | 35 | 6.45 | 1.51 |
| Mixed feedback | 30 | 5.92 | 1.21 |
| Summative feedback | 130 | 6.27 | 1.24 |
| Total | 195 | 6.25 | 1.29 |

## Conclusion

The answer to main research question of this study, whether students' willingness to improve their performance according to the feedback they received differed between three groups of different feedback conditions, proved to be negative. In contrast to expectations no

significant differences were found between the feedback conditions in terms of the students' willingness to improve their performance. This means that the students showed a similar willingness to improve their performance no matter to which feedback group they belonged.

The answer to the second research question, whether or not there was a mediating role of feedback perception constructs (like fairness, usefulness, acceptance and affect) or causal attribution constructs (like locus of causality, personal control, external control and stability) between feedback condition and the students' willingness to improve their performance, was also negative. Because no direct relationship between the feedback condition and students' willingness to improve their performance was found, a mediating role of the students' feedback perceptions or their causal attributions was not possible.

This study found a significant direct relationship between the students' feedback perceptions (affect, fairness and usefulness) and their willingness to improve their performance. This means that the students differed in their measure of willingness to improve their performance depending on their perceptions of the feedback they received. Students with higher scores on affect, fairness and usefulness also showed higher scores on willingness to improve.

The students' causal attributions (locus of causality, personal control, external control) did prove to be good predictors of their willingness to improve their performance. This means that the students differed in their measure of willingness to improve their performance depending on the causes they attributed the feedback to. Students who scored high on personal control, and students who scored high on external control as well as students who had an internal locus of causality showed more willingness to improve their performances.

The answer to the final research question proved to be positive as well. The feedback groups showed significant differences in their feedback perceptions. The results of this research question indicated that the three different feedback groups had different measures of affect towards feedback; the mixed feedback group scored significantly lower on affect than the formative and the summative feedback group. This means that students from the formative and

the summative feedback groups had more positive affect towards the feedback than did the students from the mixed feedback group. The feedback groups did not differ in their measure of perceived fairness as well as usefulness of the feedback. Similarly, the feedback groups showed significantly different scores on causal attributions (locus of causality, external control and personal control). The mixed feedback group scored lower than the formative and the summative feedback groups on internal locus of causality, the formative feedback group had the highest score on internal locus of causality. The formative feedback group had the lowest score on external control; the mixed feedback group and the summative feedback group scored significantly higher. The three feedback groups did not score significantly different on personal control.

## Discussion

The expected direct relationship between the feedback groups and the students' willingness to improve their performance was not found in this study. It was therefore not possible to test for any possible mediating roles of both the students' feedback perceptions as well as the students' causal attributions, respectively. This study was, however, able to find evidence for a direct relationship between the students' feedback perceptions and the students' willingness to improve their performance according to the feedback. Evidence for a relationship between the students' causal attributions and their willingness to improve their performance was also found.

The inability of this study to find a direct relationship between the feedback groups and the students' willingness to improve their performance as well as any mediating effects does not mean that such relationships do not exist. Practical restrictions in the design of this study might have played a role in the lack of proof for such relationships. Although the participants in this study were all students from the same bachelor's program, the groups of students may not have been adequately comparable. The summative feedback group consisted of first-year students

while the mixed feedback group and the formative feedback group consisted of second-year students. This also explains the unequal amounts of students in each of the group. More than fifty per cent of the students in the Biology and Medical Laboratory Research bachelor's program at the Hogeschool Rotterdam do not make it to the second year of the program, therefore the formative feedback group was a lot larger than the other two groups. This may have affected the results of this study as only the best performing students make it to the second year. First and second year students may differ in the way they perceive feedback as well as in the casual attributions they make. Future studies into the subject of feedback conditions could clarify this by using feedback groups that are more comparable by using groups from the same year. Using three groups of students from the same year proved to be impossible in this study because courses from the same year with three different feedback conditions were unavailable.

The content of the courses used in this study may also have affected the results of this study. Although the courses were all an obligatory part of the Biology and Laboratory Research bachelor's program at the Hogeschool Rotterdam, the three courses were about relatively different subjects and were of a different level. The answers students gave on the questionnaire may reflect their feelings about the content of the three courses instead of their feelings about the feedback they received. Similarly, because different teachers taught the courses, students' responses on the questions may have reflected feelings they may have had about their teachers instead of the feedback they received. Content of the course as well as personal feelings toward the teacher may be a threat to the validity of this study, as it is not certain if the questionnaire correctly measured students' feedback perception and causal attributions or if other factors also played a role in the answers students gave.

One of the courses in this study was a relatively new course in the BML bachelor's program; it was only the second time MBT-11 was taught in this format. The teacher indicated that some students experienced difficulties in receiving their feedback during this course; some students did not receive their feedback on time. It is therefore possible that some of the

differences found in this study were due to organizational factors as opposed to factors concerning the various feedback types.

The dependent variable used in most of the research questions in this study, students' willingness to improve their performance according to the feedback they received, is no guarantee that the students will actually improve their performance. This should be kept in mind when implementing any changes based on the results of this study. By answering the questions in the questionnaire the students simply stated their intention to use the feedback to improve their performance, it was not in the scope of this study to measure if they actually did. Future research should also examine whether students performances actually did improve after they received feedback. A longitudinal qualitative analysis of the students' work may be able to achieve this.

The quality of the feedback the students received was not taken into account in this study. Students were only asked to if they thought the feedback was useful; a subjective measure of quality. Results may reflect differences that were the due to the quality of the feedback and not the character of the feedback (summative feedback, formative feedback or mixed feedback). Future research into this subject should also take the quality of the feedback into account, for example by doing a qualitative analysis of (a sample) of the feedback.

This study has established that there are some relationships between feedback conditions and students' feedback perceptions as well as students' causal attributions. This study has not, however, looked in to the mechanisms of these relationships. Future research should also look at some of the explanations for the relationships found in this study.

Because of its design results from this study may not be generalizable to other situations. The study was performed at one bachelor's program at one institution at one location. Results from a similar study may be different if the study is performed in a different context.

An important recommendation for feedback practice in higher education is that more attention should be paid to student perceptions of feedback, as these are shown to be related to

students' willingness to improve their learning. As causal attributions are also shown to be related to students' willingness to improve their learning, educators should stress that students have control over their learning process. Students should see feedback as an opportunity to learn, not a personal criticism.

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**Appendix A: Questionnaire**

Platform Leren van Toetsen

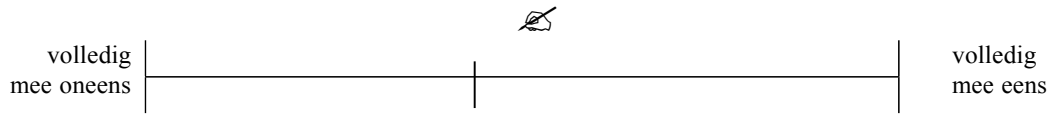
Universiteit Utrecht

Beste student,
Allereerst hartelijk dank voor je deelname. Onderstaande vragen gaan over de feedback en eventueel daarbij horende beoordeling zoals je die gekregen hebt voor de cursus _____. De antwoorden die je hier geeft blijven anoniem en worden alléén gebruikt voor dit specifieke onderzoek.

| | | |
|---|---|---|
| Studentnummer | | |
| Leeftijd in jaren | | |
| Sekse (omcirkel wat van toepassing is) | Man | Vrouw |
| Hoeveel jaar studeer je al op HBO-niveau? | | |

Instructie: Markeer op de lijn met een streep in welke mate de volgende uitspraken op jou van toepassing zijn. Voorbeeld:

"Wanneer de zon schijnt, ben ik gelukkig."




→ Des te meer de uitspraak op jou van toepassing is, des te meer naar rechts zet je de streep!

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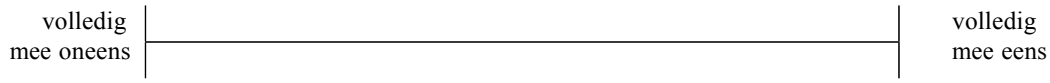
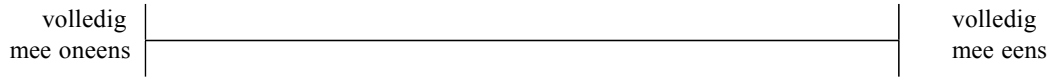
1. Ik ben tevreden met de gekregen feedback.

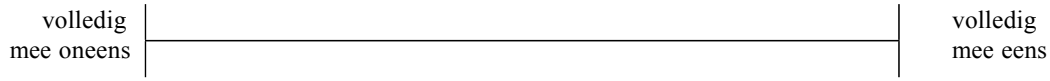



2. Ik ervaar de feedback als bruikbaar.

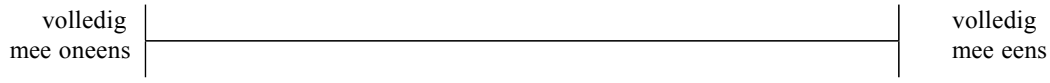

3. Ik accepteer de gekregen feedback.




4. Ik ben bereid om mijn prestatie op basis van deze feedback te verbeteren.

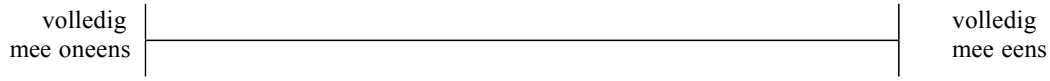



5. Ik ervaar de feedback als eerlijk.




6. Ik ervaar de feedback als behulpzaam.


7. Ik trek de gekregen feedback in twijfel.




8. Ik ben na het krijgen van deze feedback bereid om veel inspanning te investeren in het verbeteren van mijn prestatie.

9. Ik ervaar de feedback als rechtvaardig.

volledig mee oneens | volledig mee eens

10. De feedback biedt mij veel ondersteuning.

volledig mee oneens | volledig mee eens

11. Ik leg de gekregen feedback naast me neer.

volledig mee oneens | volledig mee eens

12. Ik ben bereid deze feedback te gebruiken bij een volgende opdracht.

volledig mee oneens | volledig mee eens

13. Ik voelde mij …. , toen ik deze feedback op mijn opdrachten kreeg.

*gekwetst*

volledig mee oneens | volledig mee eens

*tevreden*

volledig mee oneens | volledig mee eens

*geïrriteerd*

volledig mee oneens | volledig mee eens

*zelfverzekerd*

volledig mee oneens | volledig mee eens

*gefrustreerd*

volledig mee oneens | volledig mee eens

*succesvol*

volledig mee oneens | volledig mee eens

Instructie: Denk na over de oorzaak of oorzaken van de feedback die je voor je plan van aanpak gekregen hebt. De onderstaande vragen gaan over jouw indrukken of meningen over deze feedback. Omcirkel één getal voor elk van de volgende vragen

De feedback die ik voor mijn plan van aanpak gekregen heb schrijf ik toe aan iets…

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Dat aspecten van mijzelf reflecteert | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Dat aspecten van de situatie reflecteert |
| 2. | Dat ik kan beheersen | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Dat ik niet kan beheersen |
| 3. | Permanents | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Tijdelijks |
| 4. | Dat ik zelf kan reguleren* | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Dat ik niet zelf kan reguleren* |
| 5. | Waar anderen controle over hebben | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Waar anderen geen controle over hebben |
| 6. | Binnen mijzelf | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Buiten mijzelf |
| 7. | Stabiels over langere tijd | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Niet stabiels over langere tijd |
| 8. | Waar anderen invloed op hebben | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Waar anderen geen invloed op hebben |
| 9. | Over mijzelf | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Over anderen |
| 10. | Waar ik zelf invloed op heb | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Waar ik zelf geen invloed op heb |
| 11. | Dat niet te veranderen is | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Dat wel te veranderen is |
| 12. | Dat anderen kunnen reguleren* | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Dat anderen niet kunnen reguleren* |

*Reguleren: In goede banen leiden