The Feedback Literacy Toolbox

Practical exercises that help students generate, interpret, and internalize feedback

The Feedback Literacy Toolbox is the result of our research for our CLI-Fellowship. This research report accompanies the materials in the Toolbox, which will be made available through https://www.eur.nl/teacheur. The CLI-Fellowship is intended for educators who want to develop and implement ideas to innovate or improve their education. From September 2023 until February 2026, we have studied the relationship between feedback literacy and self-regulated learning through various interventions in the Skills Trajectories at Erasmus School of Law for both law and criminology students.

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Introduction

Over the past two years, we have implemented interventions aimed at enhancing students' feedback literacy and fostering self-regulated learning (SRL) in skills education at Erasmus School of Law. Feedback literacy refers to students' ability to interpret, evaluate, and utilize feedback effectively to improve their work. SRL involves students' proactive management of their learning processes, including goal setting, self-monitoring, and self-reflection.

These competencies are crucial for academic success, as they empower students to take ownership of their learning and continuously improve their performance. By engaging with various feedback sources – such as teacher feedback, rubrics, exemplars, peer reviews, and AI-generated feedback – students can develop a comprehensive understanding of their strengths and areas for improvement. This process not only enhances their academic skills but also cultivates lifelong learning habits.

A key motivation for these interventions is the high workload associated with providing individualized teacher feedback. Traditional feedback practices are often labor-intensive and may not always yield the desired impact, as students frequently rely heavily on teacher input without actively processing or applying it in subsequent work. By supporting students in generating internal feedback from multiple sources, the feedback process can be extended beyond the teacher's direct input. This approach not only alleviates some of the teachers' workload but also encourages students to become more independent and self-directed learners.

Furthermore, fostering feedback literacy and SRL requires deliberate guidance and scaffolding. Students benefit from structured activities that help them interpret feedback, compare their work to exemplars, and articulate actionable improvements. Such interventions encourage students to engage in reflective practice, prioritize learning goals, and take responsibility for their own progress. Ultimately, these efforts aim to shift the feedback process from a teacher-centered model to a more student-centered one, where students actively generate and apply feedback, developing both academic competence and lifelong learning skills.

Context

The interventions were implemented within the bachelor programmes Law and Criminology at Erasmus School of Law. The bachelor programme of Law starts with around 1000 students each year, whereas the bachelor programme of Criminology has specific admission requirements and only allows 120 new students each year. Both programmes contain a skills

trajectory that runs alongside the content courses (Juridisch-Academische Vaardigheden and Research Lab), where students practice the specific skills needed for their future careers. In the first year of this skills trajectory, students learn the basis of the foundational skills, here a strong emphasis on learning how to give, receive and use feedback effectively is fitting.

The course assignments selected for this study were designed to reflect core skills of the curriculum and provided opportunities for meaningful engagement with feedback. In designing the interventions, we considered both the practical constraints of the course and the pedagogical goal of fostering feedback literacy and SRL.

Students were introduced to five feedback sources: teacher feedback (individual and general feedback provided to the group), rubrics, exemplars, peer feedback, and AI-generated feedback. By engaging with multiple sources, guided through several steps of reflection, students were encouraged to compare external input with their own work, identify gaps, and develop explicit action plans. This process allowed students to practice self-regulation skills such as goal-setting, monitoring their progress, and evaluating the effectiveness of their improvements.

The study took place alongside other course activities, which were designed to complement the feedback interventions and provide a realistic learning context. This ensured that students' engagement with feedback was situated within their broader learning experiences, rather than isolated exercises. It also required our exercises to be short and concise, as they were added to the regular course activities.

Literature

Introduction

To situate these interventions within the broader research landscape, it is important to review existing literature on feedback, feedback literacy, and SRL. In this section, we examine how different types of feedback influence student learning, the challenges associated with traditional instructor-centered feedback, and the ways in which feedback literacy can support students in generating and applying internal feedback.

In literature, feedback literacy and SRL have emerged as essential competencies for fostering effective and lifelong learning in higher education. Feedback literacy refers to students' ability to interpret, evaluate, and use feedback to improve their work (Sutton, 2012; Yu, Di Zhang & Liu, 2022), while SRL involves the proactive management of one's own learning processes through goal setting, self-monitoring, and self-reflection (e.g.

Zimmerman, 2002, 2008; Pintrich, 2000). Both concepts emphasize that students are not passive recipients of information but active participants in their learning journey, engaging with feedback as part of an ongoing cycle of improvement rather than as a one-time event. Furthermore, the literature highlights the role of SRL in enabling students to take ownership of their learning processes (Zimmerman 2002; 2008; Winardi, 2024), providing a theoretical foundation for the design and evaluation of the interventions implemented in this study.

This chapter examines the intersection between feedback literacy and SRL, highlighting how the development of these competencies can enable students to generate internal feedback by comparing their own work with various external sources. Understanding this relationship provides a theoretical and practical foundation for designing interventions that foster independent, reflective, and self-directed learning, while also supporting teachers in extending the reach and impact of their feedback within the constraints of their workload.

Self-regulated learning

SRL refers to the degree to which learners are proactive in setting goals, monitoring their progress, and adjusting their learning strategies accordingly (Butler & Winne, 1995). Several models of SRL have been developed based on different theoretical perspectives. For example, Zimmerman (2002) defines SRL as the process by which students activate and sustain thoughts, behaviors, and emotions to achieve personal learning goals. His three-phase cyclical model (Zimmerman, 2002; 2008) includes:

1. Forethought (goal setting and strategic planning),
2. Performance (self-control and self-observation), and
3. Self-reflection (self-judgment and adaptation).

Similarly, Pintrich (2000) identifies four phases of SRL – forethought, monitoring, control, and reflection – each operating across cognitive, motivational, behavioral, and contextual domains. These frameworks emphasize that learning is not only cognitive but also metacognitive and affective, requiring students to regulate not just *what* they learn but *how* and *why* they learn. At the level of skills, this involves the development of metacognitive knowledge (awareness of one's own cognition, strategies, and task demands) and metacognitive regulation (the ability to plan, monitor, and evaluate learning activities) (Dinsmore, Alexander, & Loughlin, 2008). Key metacognitive skills include goal setting, strategic planning, self-questioning, progress monitoring, and adaptive help-seeking, which enable students to make informed decisions about how to approach and improve their learning (Panadero, 2017; Zimmerman, 2008). In addition, the affective dimension of self-regulation includes skills such as emotional regulation, motivational control, and persistence, which play a critical role in sustained engagement with complex learning tasks

(Efklides, 2011; Pintrich, 2000; Zimmerman, 2008). Together, these cognitive, metacognitive skills foster students' self-awareness, evaluative judgment, and agency, enabling them to take ownership of both learning processes and learning outcomes.

Recent research conceptualizes SRL as a teachable, cyclical competence that can be effectively scaffolded through structured reflection, formative assessment, and feedback-rich learning environments in higher education (e.g. Panadero & Lipnevich, 2022). Furthermore, it indicates that SRL skills are teachable and can significantly enhance student motivation, engagement, and academic achievement (Pintrich, 2000; Zimmerman, 2002). In the context of higher education, and specifically within law and criminology skills education, fostering SRL is essential to support students in managing complex assignments and developing professional competencies.

Many students, however, demonstrate limited self-regulatory skills, particularly in the early phases of their higher education (De Bruijn, 2017). They often rely heavily on teacher feedback, structured instructions, and external regulation, while experiencing difficulties in independently planning their learning activities, monitoring their progress, and critically reflecting on the quality of their work (Tai et al., 2018; Panadero, 2017; Zimmerman, 2002). Research shows that without explicit scaffolding, students tend to adopt surface-level learning strategies and struggle to translate feedback into concrete improvement actions, which limits metacognitive awareness required for effective SRL (Efklides, 2011; Nicol & Macfarlane-Dick, 2006; Jonsson, 2013). Consequently, structured opportunities to practice goal-setting, self-monitoring, and reflective thinking are essential to gradually shift responsibility for learning from teachers to students (Hattie & Timperley, 2007).

Practical strategies to promote SRL include structured self-assessment, reflective exercises, and iterative practice. Importantly, these processes are most effective when coupled with timely and actionable feedback, which helps students evaluate their performance, identify gaps, and adjust strategies accordingly (Hattie & Timperley, 2007). By embedding SRL within skills education, teachers can encourage students to move from passive recipients of feedback to proactive agents in their own learning, developing both academic competence and lifelong learning skills while reducing overreliance on instructor feedback (Nicol & Macfarlane-Dick, 2006; Carless & Boud, 2018).

Feedback literacy

Feedback literacy refers to the capability to understand, interpret, and use feedback to improve one's work (Carless & Boud, 2018; Nieminen & Carless, 2022). Beyond mere comprehension, feedback literacy encompasses the behavioral engagement necessary to act on feedback and integrate it meaningfully into one's learning process (Carless, 2022). In

other words, it is not enough for students to receive feedback, they must be able to critically evaluate it, relate it to their own performance, and generate actionable steps for improvement.

Nicol (2019; 2021) highlights that effective feedback processes enable students to compare their current performance against external reference points, such as rubrics, exemplars, peer feedback, and teacher feedback. Through these comparisons, students can generate internal feedback, defined as the personal insights that arise from evaluating one's work against reference information. This internal feedback is central to developing SRL, as it allows students to take responsibility for identifying areas for improvement and planning concrete actions, rather than relying solely on teacher guidance.

Panadero and Lipnevich (2022) emphasize that feedback literacy is closely linked to students' self-regulation abilities. They argue that effective interventions should not only provide feedback but also explicitly teach students how to interpret, evaluate, and apply it, thereby enhancing both evaluative judgment and self-regulatory processes (Carless & Boud, 2018). Sutton (2012) highlights the emotional dimension of feedback, stressing the importance of equipping students with the skills to effectively process and use feedback. In the context of skills education in law and criminology, these abilities are crucial. By developing feedback literacy, students learn to independently assess the quality of their work using rubrics, exemplars, and peer feedback (Nicol, 2020). This shifts feedback from a teacher-driven activity to a learner-centered practice, fostering professional competence and autonomy beyond the classroom.

Peer review, in particular, has been shown to facilitate the generation of internal feedback. Nicol and McCallum (2022) argue that requiring students to articulate evaluative judgments and reflect on their own work in light of others' performances makes internal feedback more explicit and actionable. Similarly, interventions that engage students with multiple feedback sources – such as exemplars, rubrics, and AI-generated feedback – help them practice comparing their work with different standards, thereby deepening their evaluative skills and reinforcing self-directed learning behaviors.

The relationship between feedback literacy and self-regulated learning

The connection between feedback literacy and SRL lies in the regulative function of feedback. Feedback can be conceptualized as information that helps learners identify discrepancies between their current performance and desired goals, providing guidance on how to improve (Hattie & Timperley, 2007; Sadler, 2010). According to Hattie and Timperley (2007), effective feedback addresses three key questions: "Where am I going?" (goal setting), "How am I going?" (monitoring), and "Where to next?" (planning for improvement). These

dimensions closely align with the phases of SRL described by Zimmerman (2002, 2008) and Pintrich (2000), highlighting the intertwined nature of feedback and self-regulation.

Moreover, Nicol (2021) differentiates between external feedback, information provided by others, and internal feedback, which arises when students actively compare their work to a standard or model. Feedback literacy enables students to engage with external feedback proactively, interpreting, evaluating, and applying it to their own learning (Carless & Boud, 2018; Carless, 2022; Sutton, 2012). Students with strong feedback literacy are better equipped to generate internal feedback, which Nicol (2019, 2021) defines as the insights that arise when learners actively compare their work with sources of external feedback. This internal feedback process is itself an act of self-regulation: it involves reflection, monitoring, and adaptation, allowing students to plan and enact improvements autonomously.

Engaging students with a variety of feedback sources, including peers, rubrics, exemplars, and AI-generated feedback, further strengthens their capacity to self-regulate and transform external feedback into internalized learning gains. Various feedback sources provide different opportunities for students to practice self-regulation, evaluate multiple perspectives, and translate external feedback into meaningful learning gains (Panadero & Lipnevich, 2022; Nicol, 2021; Winstone & Carless, 2019).

The relationship between SRL and feedback literacy is reciprocal. While effective feedback can scaffold goal setting, self-monitoring, and reflective practice (Panadero et al., 2018; Hattie & Timperley, 2007), students with well-developed self-regulatory skills are more likely to seek, interpret, and act on feedback effectively (Zimmerman, 2002; Winstone et al., 2017). In the context of skills courses in higher education, this reciprocity is particularly relevant. Students often demonstrate high dependence on teacher feedback, and repeated mistakes across assignments indicate that feedback alone does not automatically translate into improved performance (Carless & Boud, 2018; De Bruijn, 2017). By fostering feedback literacy alongside SRL, interventions can help students actively generate internal feedback, extend the feedback process beyond direct teacher input, and reduce the burden on educators while promoting autonomous, self-directed learning.

Linking self-regulated learning to quality awareness

A core challenge in feedback and SRL is enabling students to understand and judge quality rather than merely receive information about their performance. Tai et al. (2018) have argued that evaluative judgement – the capability to make decisions about the quality of one's own and others' work – is a necessary competence for higher education graduates, closely aligned with contemporary reconceptualizations of feedback as an active, learner-driven process (Carless, 2022; Nicol, 2019). This concept situates the development of quality

awareness within a pedagogical framework and highlights how assessment, feedback, and reflection practices can support students in becoming independent learners who can meaningfully interpret and act upon feedback (Hattie & Timperley, 2007). It is exactly the active interaction with criteria and feedback through ongoing evaluative activities (such as self-assessment, peer review and comparison with exemplars) that help develop both evaluative judgement and SRL skills (Nicol & McCallum, 2022; Tai et al., 2018).

Evaluative judgement requires both an understanding of quality standards and the ability to apply this understanding when evaluating performance (Tai et al., 2018). This highlights the close relation of SRL and quality awareness. Quality awareness refers to a student's sense of what "good" means: a shared understanding of criteria, expectations and standards, not only for a single task, but more broadly as a framework for what constitutes high-quality work. Quality awareness gives direction to learning, supports self-analysis and self-regulation, and makes feedback more effective. Without clarity about what "quality" looks like, feedback risks being ambiguous or unhelpful; with clear standards and students' understanding of them, students can compare their work, evaluate it critically, and self-regulate toward improvement (Hattie & Timperley, 2007).

The combination of quality awareness and SRL enables students to understand what "good work" means, to monitor their own performance, and to strive toward high standards independently. To self-regulate effectively, students must understand what quality looks like, how to assess it and how to adjust their performance accordingly (Sadler, 2010; Nicol & Macfarlane-Dick, 2006). This ability to guide one's own learning is essential for recognizing, evaluating, and internalizing quality standards across tasks and contexts. In this way, feedback literacy serves as a bridge between SRL and quality awareness, as it enables students to compare their current performance with internalized standards and to regulate their learning on that basis.

In practice, SRL provides the process of learning, an iterative cycle of goal setting, planning, monitoring and reflecting, while quality awareness defines the direction of that process by making explicit the standards, benchmarks and criteria against which skills can be judged (Zimmerman, 2002; Pintrich 2000; Sadler, 2010). Feedback literacy connects these two constructs, enabling students to recognize discrepancies between their current performance and desired standards and to use feedback to guide improvement, through internalized improvement strategies (Nicol & Macfarlane-Dick, 2006; Carless & Boud, 2018). Together, SRL, quality awareness and feedback literacy form a coherent learning framework in which students not only understand how to regulate their learning, but also what high-quality work entails and how to move purposefully towards it through informed evaluative judgement (Tai et al., 2018).

Empirical and theoretical literature supports this interplay. For instance, studies on SRL in higher education show that students who adopt metacognitive and motivational strategies achieve better outcomes, particularly in tasks requiring self-directed learning and complex problem-solving (Caixia et al., 2025). Similarly, when educators embed clarity about quality standards through exemplars, rubrics, peer-review, and reflective dialogue, students become increasingly capable of internal evaluation and improvement (Sadler, 2010).

This insight has direct implications for education design. By combining SRL-supportive practices (planning, monitoring, reflection) with structured ways to build quality awareness (clear criteria, exemplars, peer and self-evaluation, iterative dialog), educators can foster students' ability to generate their own internal feedback, self-assess, and continuously improve, thereby reducing reliance on instructor feedback while building deeper, sustainable learning habits.

Summary

The reviewed literature demonstrates that feedback literacy and SRL are dynamic, mutually reinforcing processes that play a central role in effective higher education. Developing students' ability to interpret, evaluate, and act on feedback not only enhances their immediate performance but also fosters long-term learning autonomy.

Effective educational interventions should therefore aim to:

- Develop students' capacity to interpret and act on feedback;
- Encourage the generation of internal feedback through structured comparisons; and
- Integrate reflection and self-assessment as integral parts of the learning process.

These theoretical insights directly informed the design of the interventions implemented in this study. By engaging students with a variety of feedback sources – including teacher feedback, general (teacher) feedback, rubrics, exemplars, peer feedback, and AI-generated feedback – students were guided to compare their work against multiple standards, identify gaps, and generate actionable internal feedback. In doing so, the interventions aimed to strengthen both feedback literacy and self-regulatory skills, while also addressing practical challenges such as instructor workload and students' dependence on teacher feedback.

Method

This chapter describes our methodological approach used to investigate the effectiveness of interventions designed to enhance feedback literacy and SRL among students in the Law and Criminology bachelor programmes at Erasmus School of Law. Building on the theoretical insights outlined in the previous chapter, the study focuses on how students

engage with multiple feedback sources – teacher feedback, rubrics, exemplars, general feedback, peer feedback, and AI-generated feedback – and how these interactions support the generation of internal feedback and SRL behaviors.

The methodology addresses both quantitative and qualitative aspects of the study. Quantitative data were collected through surveys to capture students' self-reported feedback literacy as well as their perceptions of various feedback sources and the interventions. Qualitative data were collected through an analysis of students' assignments before and after the feedback interventions to examine how external feedback contributed to performance improvements and the development of internal feedback, reflections students wrote during the assignment of the intervention complemented by formal conversations with students (focus groups and interviews) and informal conversations with teachers.

By combining these approaches, the study aims to provide a comprehensive understanding of which feedback sources and activities are most effective in promoting feedback literacy as well as to inform recommendations for future educational practice.

Questionnaire

Various instruments exist to measure students' feedback literacy, most of which focus on students' beliefs about feedback rather than their actual behaviors (Liao, 2021; Zhan, 2022; Song, 2022; Yu, Di Zhang & Liu, 2022; Yildiz et al., 2022; Dong et al., 2023; Dawson et al., 2024). While feedback is increasingly seen as an active process requiring student engagement (De Kleijn, 2023), existing questionnaires provide little insight into the activities students perform during this process.

To address this, we used the framework by Dawson et al. (2024), which integrates Carless and Boud (2018) and Molloy et al. (2020) into the Feedback Literacy Behaviour Scale. This framework focuses on five components of student behavior in feedback: seeking, making sense of, using, providing, and managing feedback. Analyses indicate initial validity, a five-factor structure, and acceptable test-retest reliability, making it suitable for our study.

To explore how students generate feedback, we selected 16 potential feedback sources based on Nicol (2021) and additional sources based on our own experiences in skills education, allowing us to assess students' valuation of these sources (see Table 1).

Table 1: *Sources students might use to generate feedback used in this research*.

Nicol (2021)	**Additional sources**
Published scientific articles	General feedback of teachers during lectures
Task goals/intended learning outcomes	General feedback of teachers in a webcast
Rubric, assessment form, criteria	Exercises made in the classroom

Exemplars	Video's containing general instruction
Written individual teacher comments	Feedback generated by AI
Written general teacher comments	Feedback of others outside your studies
Written peer feedback	
Discussions/conversations with the teacher	
Discussions/conversations with fellow students	
Work of fellow students	

After we agreed on which questionnaire we wanted to use, we researched the best way to translate the instrument into Dutch. We decided upon using the back-translation procedure, or reverse translation procedure,[1] which is a commonly used method to validate the quality of translations and helps preserve the original meaning of the questions when translated (e.g. Tyupa, 2011). First, we asked two individuals to translate the questionnaire from English to Dutch. We also used ChatGPT to provide us with a third translation. These translations were then translated back from Dutch into English, without the help of the original questionnaire, also by two individuals and ChatGPT. Then, for each question, we compared the three Dutch translations to examine which translation would stay closest to the intended meaning of the question. In the instances where the three Dutch translations would differ, we also examined the original English questionnaire and the three back-translated versions. Due to the low sensitivity of the questions, the expected levels of understanding of the Dutch language of our target population and some time constraints, we only applied the process that is referred to by Tyupa (2011) as the 'general algorithm'.

Participants

The participants in this study were all students at Erasmus School of Law. We focused on the skills courses both in the Dutch law program (JAV) and in the criminology program (Research Lab). In the first academic year of this research the participants were recruited. In the second academic year, the interventions were either integrated into the curriculum or made available for voluntary participation.

Quantitative data

In the first year of this study first-year bachelor students were recruited through announcements as well as by presenting the study during course meetings. The purpose and topic of the research were shared with potential participants. In contrast, Research Lab students were given the opportunity to indicate a preferred time for participation in meetings during subsequent blocks when they participate in this study. This recruitment

[1] Other commonly used methods include simple translation, and translation by committee.

strategy resulted in a small number of participants for JAV (N = 16) and Research Lab (N = 3). There were two groups of participants. Students in Group A completed the assignments in a classroom setting, with a teacher present. A number of students (16) initially registered for participation; however, they did not attend all sessions or complete all assignments. Students in Group B completed the same assignments independently at home (RL: N=3).

In the second academic year, the interventions were offered to all students. They were integrated into the curriculum for all B1 students, including both Research Lab and JAV cohorts, as well as for B2 students in the Research Lab course. In contrast, B2 students in the JAV course could voluntarily sign up to participate in the assignments.

In addition, academic performance data were collected for all Bachelor 2 students in the second academic year, in which the interventions were implemented as a mandatory part of the curriculum. This cohort therefore represents a full intervention group. For comparison purposes, grade data from the Bachelor 2 cohort of the preceding academic year were included, in which no interventions were offered and which functioned as a control cohort. For both cohorts, grades from Bachelor 1 and Bachelor 2 were available, allowing comparisons of both final performance in B2 and development from B1 to B2.

Prior to participation, all participants gave their written consent for their data to be used in this study. When the interventions were integrated into the curriculum a note was added to the worksheets about the research and use of data, with that a webcast was also published about the research so that students stayed informed about it.

Qualitative data

Participants who took part in the study during the first academic year were also invited to participate in focus groups, both prior to the intervention (N=5) and after the intervention period (N=2). In the second academic year, students were recruited for focus groups through an announcement explaining the purpose of participation. For Research Lab students, indicating a preferred time served as an incentive. This recruitment strategy resulted in a small number of students participating in the focus groups (RL 1: N = 8, RL 2: N= 2).

In addition to the focus groups, student assignments were also used as qualitative data. These assignments were analyzed to examine the feedback students generated during the intervention, as well as the reflections they wrote throughout the tasks. Researchers compared students' work produced prior to the intervention assignments with the work produced afterwards, with particular attention to whether the feedback points identified by students had been implemented in their subsequent work. For the first academic year, this included fully completed documents from participating students for RL (N=3). For JAV, one student completed all assignments; the remaining assignments were completed by different

students (5 in total). In the second academic year for JAV, different students were involved for each assignment; only the fully completed documents were analyzed (11 different students). For Research Lab students in the second bachelor year, two students per category (dissatisfied, neutral, satisfied), were selected and then randomly chosen for analysis of the assignments, resulting in a total of six students (N = 6).

Data collection

In order to gain a complete understanding of the feedback literacy of our participants and the appreciation of feedback sources and interventions, we asked students to complete our questionnaire. The full questionnaires can be found in appendix B (Dutch) and C (English). The questionnaire was completed individually and anonymously and we labelled the completed questionnaires according to their group, so that we could analyze the data for the separate groups and together (Table 2).

In the first academic year of this study, a small number of students (n = 10) participated in the intervention, while the remaining students did not receive any interventions. This cohort was therefore be treated as a control group in the analyses, acknowledging several methodological limitations. Notably, the students who participated in the intervention could not be distinguished from non-participating students in the dataset and were thus included in the control group analyses. However, given the limited number of intervention participants relative to the total sample size at the first measurement (N = 190) and at the final measurement (N = 49), the potential impact of this contamination on the overall results is likely to be minimal. The control group completed the survey halfway through the academic year and again at the end of the academic year.

In the second academic year, all students were offered the interventions. For B1 students, the assignments were integrated into the curriculum and therefore compulsory; this included both Research Lab and JAV students. Consequently, analyses of B1 combine these cohorts, as all students completed the interventions and meaningful comparisons can be made across the full group.

For B2 students, the situation was more heterogeneous. All Research Lab students participated in the interventions as part of the curriculum, whereas participation among JAV students was voluntary. JAV II students also had extremely low participation at the final measurement (N = 7), making their data unsuitable for inclusion in analyses of intervention effects. Therefore, primary analyses for B2 focus on Research Lab students only, ensuring that included students had meaningful exposure to the interventions.

It is also important to note that the interval between measurement points differs between the control and experimental groups. For the control group, the interval spanned only half an

academic year, whereas for the year in which the interventions were offered to all students, the interval covered a full academic year. This difference should be taken into account when interpreting longitudinal comparisons between groups.

Table 2: *Number of completed questionnaires:*

Academic year 2023-2024		
	Start	Finish
Control JAV I	86	14
Control Research Lab 1	104	35
Academic year 2024-2025		
	Start	Finish
Bachelor 1	49	85
Bachelor 2	139	62
JAV I / Experimental	14	22
JAV II	53	7
Research Lab 1 / Experimental	35	63
Research Lab 2	86	55

In addition, several focus groups and interviews were conducted. At the start of the study, focus groups were held with participating students from Research Lab and JAV. At the end of this first academic year, these students were invited to take part in a follow-up focus group; however, the response rate was low. One Research Lab student participated in an individual interview, while two other Research Lab students provided written responses to a set of questions. One JAV student participated in an individual interview. Following the interventions in the second year, focus groups were conducted with Research Lab students.

Table 3 provides an overview of the students who participated in the different focus groups. The guides for the focus groups can be found in appendix D & E.

Table 3: *Number of participants in the focus groups/interview:*

		Start	Finish
First research year	JAV I	2	1
	Research Lab I	3	1
Second research year	JAV I	-	0
	Research Lab I	-	8
	JAV II	-	0
	Research Lab II	**-**	**2**

We initially decided to organize the experimental phase of our study over the course of 8 blocks, starting in the first study year in block 1.5 and continuing with the same group of students into the second study year until block 2.4. This would give us the opportunity to

experiment with 8 different interventions, and to compare them with the purpose of evaluating which of the interventions were most effective. At this phase, we also wanted to make a distinction between group A and group B: for group A, an extra meeting was organized in each block, in which a skills teacher guided the students through the exercises. Group B was given the same exercises, but were asked to complete them individually at home. This way, we would be able to also investigate the role of the teacher in the process of generating internal feedback.

Data collection for each of the interventions was organized as follows:

1. We asked students to prepare the assignment for the regular course (JAV or Research Lab).
2. We then asked students to reflect on this assignment, for which we developed a form that students had to fill in.
3. The teacher evaluated the assignments according to pre-determined criteria, so that we could verify the self-reports of students with more objective evaluations.
4. Exercises, either in class (group A) or at home (group B).
5. Immediately after the exercises, students were asked to make their comparison explicit and to write down what they had learned and what they wanted to adjust in their assignment. Copies of these forms were also collected.
6. Students were given some time to make the proposed adjustments and to hand in an improved assignment.
7. Again students were asked to write a reflection on their adjusted assignment and the improvements they made.
8. The teacher also evaluated the adjusted assignment, so that we could again verify the self-reports of the students with more objective evaluations.

These steps would give us information on which exercise would lead to the most/best improvements in the assignments. By comparing the results of group A and B, we would be able to study the role of the teacher in the feedback process. By comparing the results of the groups in JAV and Research Lab, we would be able to investigate if the exercise were equally effective in both skills courses.

Unfortunately, we found that student interest in both group A and group B was considerably lower than anticipated. Students that did sign up for one of the groups sometimes did not show up, or did not hand in the forms connected with the exercises. Midway through the experimental phase (after block 1.8), we therefore decided not to introduce additional interventions, but instead to re-test the interventions that we already developed up to that point in the new academic year, offering them broadly to all first-year students in JAV. Full-time students received the exercises from group A during class, while VMO-students were offered the exercises from group B on a voluntary basis. For first- and second-year Research

Lab students, the exercises were provided either during practical sessions (Group A) or online via Canvas (Group B), depending on the coursework in each block; in some cases, a combination of both formats was used.

For this purpose, we wrote more elaborate teacher instructions, that would provide all skills teachers, also those that had no connection with the project, sufficient instructions to work with the exercises during their classes. At the same time, we also continued with the initial group of students into the second year, but also with the same exercises as in their first year.

Even with this approach, we unfortunately observed a continued decline in engagement. Many students omitted the pre- and/or post-exercise reflections, which limited the number of complete datasets available for analysis. Consequently, it was not feasible to track individual students over a two-year period, as many did not complete all exercises.

Feedback interventions

To investigate how students can be guided to generate internal feedback and strengthen SRL, we selected six complementary feedback interventions: peer feedback, general (teacher) feedback, rubric-guided self-assessment, AI-generated feedback, exemplars, and a feedback dialogue based on teacher feedback. These interventions were chosen because each maps onto different mechanisms known to promote evaluative judgement, metacognition and self-regulation (e.g. clarifying standards, providing multiple comparison points, and stimulating reflection), and together they form a diverse palette of approaches that are feasible to implement in skills education.

Reflection before and after

In all our interventions, before each exercise, students reflected on their assignment: what went well, what was challenging, and which feedback question would they pose to an expert regarding their work? The intention of this reflection was to activate monitoring and planning within SRL (Zimmerman, 2002; Panadero et al., 2023).

In all our interventions, we not only provided students with feedback (from various sources) but also systematically prompted them to actively engage with it, a condition consistently highlighted in the literature as crucial for impact. After all, feedback only leads to learning when students interpret it, connect it to their own work, and translate it into concrete next steps (Hattie & Timperley, 2007; Winstone & Carless, 2019; Nicol, 2021). Therefore, students were required in each intervention after the exercise to write down their action points and areas for improvement, enabling them to convert external information into plans for adjustment and further practice. This combination of prior reflection and specifying follow-

up actions makes the feedback cycle explicit and strengthens the development of feedback and assessment literacy.

Six types of feedback interventions

Peer feedback

Peer feedback exposes students to the work of their peers, prompting them to compare, judge and reflect on quality. These are processes that generate internal feedback and develop evaluative judgment (Nicol & McCallum, 2022). Peer feedback can be given based on previous knowledge or based on criteria for the assignment. Evidence-based studies show that peer assessment interventions can produce meaningful improvements in performance and learning, particularly when combined with guidance, rubrics or training (Yan et al., 2022). We included peer feedback because it is scalable, dialogic, and aligns with our aim to shift some of the feedback workload away from instructors while simultaneously training students to calibrate their judgement.

The exercise that we designed focused specifically on the value of *giving* feedback. In the first part of the exercise, students are asked to give feedback on the work of their peer based on the criteria for the assignment, after which they reflect on how the given feedback might also be applicable to their own work. In the second part of the exercise, students can read the feedback they received from their peers, after which they reflect on how to apply this feedback to their work. Both steps are then combined into actionable points of improvement.

General (teacher) feedback

Teacher feedback remains a powerful source of information about task quality and next steps when it addresses task, process, and self-regulation levels (Hattie & Timperley, 2007). However, from experience we know that many students often make similar mistakes. Instead of providing individual feedback to each student, we designed an exercise in which the teacher provides general feedback to the group as a whole.

The general feedback is organized based on the criteria for the assignment and in the exercise, students study each criterium thoroughly, before moving on to the next criterium. This way, students need to pause and reflect on what the feedback on that specific criterium actually means for their work and make this explicit (Winstone et al., 2017).

Rubric-guided self-assessment

Rubrics make expectations explicit and provide concrete criteria for comparison, a core prerequisite for developing quality awareness and self-monitoring (Panadero et al., 2023). Meta-analytic reviews indicate that rubrics (especially when used formatively and combined with self-assessment) produce moderate positive effects on academic performance and

support SRL (Panadero et al., 2023). We used rubrics and self-assessment because they directly scaffold the forethought and monitoring phases of Zimmerman's SRL cycle: students set goals against the rubric, monitor progress, and plan changes.

Although rubrics are usually provided together with an assignment or exam, students often do not take the time to carefully study them and to translate them into actionable criteria. In the exercise we designed, students are asked to distill a checklist from each topic in the rubric, and then to check their (formative) work against the checklist. This way, they immediately see what their actionable points of improvement are.

Exemplars

Exemplars (high-quality sample work or anonymized work of peers) provide concrete standards and help students recognize features of higher and lower quality work, supporting calibration and evaluative judgement (Sadler, 2010; Nicol, 2021). Empirical work shows that comparison with exemplars improves students' ability to judge their own work and to adopt strategies aligned with higher standards. Important when working with exemplars is to provide multiple exemplars, so that students can compare them based on the criteria. We included exemplars because they are a low-cost, high-value resource: when students actively analyze exemplars against criteria and their own drafts, they are practicing the comparisons that produce internal feedback.

In the exercise we designed, students first need to discuss in small groups what criteria they consider important for the assignment. Then, they will compare two exemplars with these criteria and assess how these exemplars score for each criterium. After that, they will also assess their own work against the criteria. In the last step, students will rank their work and the two exemplars from best to worst.

AI-generated feedback

The rapid emergence of generative AI offers new opportunities for feedback literacy and SRL. Integrating GenAI as a feedback partner has allowed students to receive immediate, personalized feedback that supported the interpretation and application of this feedback into concrete actions, while fostering active engagement and self-regulation. AI-generated feedback, such as automated hints, comparisons, or formative checks, can be rapid, consistent, and scalable, and evidence suggests it can support skill development when thoughtfully integrated (Venter et al., 2024; Bauer et al., 2025). Zhan et al. (2025) developed a framework for understanding student engagement with AI-generated feedback, highlighting its varying influence across the feedback process stages: seeking, understanding, and acting upon feedback. While AI-generated feedback is readily accessible, it does not automatically lead to deep engagement. They found that feedback literacy is crucial for writing effective prompts during the seeking stage, while evaluative

judgment and SRL skills are essential for understanding and ethically applying feedback. Additionally, the three phases of SRL (forethought, performance control, self-reflection) were shown to intertwine with the feedback process, suggesting that GenAI introduces new demands for feedback literacy as a concept.

In the light of this research, we introduced AI-generated feedback to explore how students perceive and use machine-generated input alongside human guidance, and to test whether instant AI-generated feedback could provide additional comparison points to strengthen internal feedback processes. Throughout, AI-generated feedback was applied cautiously and always paired with teacher guidance and reflection prompts. Considering that the use of AI-generated feedback in educational practices is still in its early stages, any current approaches developed in this study should be regarded as provisional, allowing room for adaptation as AI technologies continue to evolve.

Feedback dialogue based on teacher feedback

Dialogic feedback practices, such as structured conversations or written dialogues that prompt students to seek clarification, justify choices, and plan revisions, enhance student agency and help translate external comments into actionable improvements (Winstone et al., 2017; Winstone & Carless, 2019). We implemented a feedback-dialogue intervention that built on instructor comments but required students to generate targeted action plans and follow-up questions, explicitly scaffolding the 'use' and 'respond' stages of feedback processes (De Kleijn et al., 2023) to support uptake and internalization.

The intervention was adapted from a more elaborate exercise developed by *Platform Leren van Toetsen*, publicly available under a CC license.[2] The original conversation tool guides small groups of students through structured steps—reading, emotion-checking, analyzing, discussing, and constructing concrete action plans—promoting active engagement and translating feedback into clear, shared next steps. For our purposes, we condensed the steps and incorporated a plenary discussion, and also created a DIY written version for individual use. While the interactive dialogue is absent in this DIY version, students are still prompted to reflect on their emotions and analyze the feedback they received, maintaining the core elements that support feedback literacy and ownership over learning.

Why these six and not others?

We selected these six interventions because they (a) represent diverse and complementary mechanisms for generating internal feedback (expert feedback, peer comparison, explicit criteria, example-based benchmarking, technology, and dialogic uptake), (b) are practicable

[2] https://lerenvantoetsen.nl/hoe-stimuleer-je-een-feedback-dialoog-eerste-ervaringen-met-een-gesprekstool/.

within regular course workflows in skills education, and (c) map directly onto the SRL cycle (forethought, performance/monitoring, reflection). Each intervention also reflects strong empirical foundations: rubrics/self-assessment and peer assessment are supported by meta-analyses and syntheses (Panadero et al., 2023; Yan et al., 2022), peer review and internal feedback mechanisms by Nicol (2021; Nicol & McCallum, 2022), and dialogic/agency-focused approaches by Winstone and colleagues (Winstone et al., 2017; Winstone & Carless, 2019). AI-generated feedback is newer but rapidly accumulating evidence suggests cautious, scaffolded implementation can add value (Venter et al., 2024; Bauer et al., 2025; Zhan et.al., 2025).

That said, the literature also recognizes many other useful feedback interventions and sources that were beyond the scope of our research, for example, lecture slides or videos, textbooks or journal articles, diagrams, graphs etc. (Nicol, 2021). We explicitly limited the study to six interventions to keep the design manageable and to allow sufficient depth of implementation and analysis for each approach.

In our toolbox, the exercises we designed are meant precisely to activate the synergy between SRL, quality awareness and feedback literacy. Through these exercises, students learn not only *how* to regulate their learning, but also *what* quality looks like, and thus gradually develop both SRL and robust quality awareness. Building on Tai et al. (2018), our selection of interventions intentionally support different facets of evaluative judgement and SRL. Rubric-guided self-assessment and exemplars help students clarify and apply standards, by making explicit what quality entails. Peer feedback and feedback dialogue create iterative opportunities to compare, justify and discuss quality judgements. General (teacher) feedback and AI-generated feedback offer diverse external reference points that students must interpret and integrate into their evaluative processes. All interventions prompt students to articulate action points, which strengthen the transition from external to internal feedback. A list of all the developed materials can be found in appendix A.

Data analysis

The quantitative analyses consisted of two components: analyses of academic performance and analyses of survey data.

For academic performance, grades from the first and second bachelor year (B1 and B2) were analyzed for both the experimental group and the control group. To examine whether the development of grades over time differed between the two groups, a mixed-design ANOVA was conducted with time (B1 and B2) as the within-subject factor and group (experimental versus control) as the between-subject factor. In addition, independent-samples t-tests were used to compare the mean B2 grades of the experimental group with those of the

previous cohort. To examine within the experimental group whether characteristics of the intervention were associated with academic performance, multiple linear regression analyses were conducted. Both growth from B1 to B2 and final level (mean B2 grade) were used as dependent variables, with completion of assignments, level of seriousness, and perceived usefulness of the assignments included as predictors.

The survey data were analyzed to gain insight into feedback literacy and the perceived usefulness of different feedback sources and interventions. Changes in feedback literacy across multiple measurement moments were analyzed descriptively and, where applicable, tested using t-tests. For the usefulness of feedback sources and feedback interventions the same analyses were used, with the aim of identifying which forms of support students perceived as helpful for generating feedback independently. The survey data were interpreted exclusively at the level of perceptions and evaluations; no conclusions were drawn about the actual use of feedback sources or interventions. For all statistical tests, a significance level of $\alpha = .05$ was applied.

Because of the decline in engagement, our qualitative analysis is primarily based on anecdotal observations, drawing on both fully and partially complete datasets to derive general conclusions regarding the impact of the exercises and students' experiences. To construct the datasets, all (mostly) completed forms (reflections, filled in feedback exercise, first try and final product) were collected per group and per intervention and subsequently combined at the individual student level. Later a few datasets per group were analyzed deeper for each intervention.

This way, supplementary information was drawn from classroom observations, student-completed forms, teacher forms, and conversations with instructors. These sources were used to contextualize and enrich the quantitative findings and to highlight examples and nuances in students' experiences and teacher interactions. The information from these sources was not subjected to systematic qualitative analysis but was used to illustrate and clarify trends and insights emerging from the quantitative data. In this way, this contextual information supports the interpretation of the quantitative results and contributes to a more comprehensive understanding of the effects of the intervention.

Results

This study aimed to gain insight into the extent to which feedback interventions contribute to students' feedback literacy, their appreciation of feedback sources, and their academic performance. The results are presented in full below. First, the development of feedback literacy and perceptions of feedback are discussed, followed by the analysis of academic

performance and a discussion on the integration between observations and quantitative findings. The analysis below suggests that feedback interventions are primarily effective for students who engage actively and seriously with the exercises, with both quantitative and qualitative data highlighting the interplay between SRL, feedback literacy and quality awareness.

Development of feedback literacy

The development of feedback literacy was measured at the beginning and at the end of both bachelor year 1 (B1) and bachelor year 2 (B2). Overall, the mean feedback literacy scores remained relatively stable across measurement moments. In both groups, a slight decrease was observed from the beginning to the end. For B1 from 4,74 to 4,70 (table 4) and for B2 from 4,63 to 4,59 (table 5). These differences are not significant and small.

Tabel 4: *Independent Sample T-test Feedback Literacy Scores in B1.*

Subscale	Mean Start	N	Mean Finish	N	Difference	t	p	Cohen's d
Seeking	4,43	49	4,52	86	0,09	-0,671	0,504	-0,120
Interpreting	4,82	49	4,74	86	-0,08	0,659	0,511	0,118
Using	4,81	49	4,58	86	-0,22	1,928	0,056	0,345
Providing	4,68	49	4,62	86	-0,06	0,488	0,627	0,087
Responding	4,96	49	5,07	86	0,11	-0,905	0,367	-0,162
Overall	4,74	49	4,70	86	-0,04	0,471	0,638	0,084

*p < .05. **p < .01.

Tabel 5: *Independent Sample T-test Feedback Literacy Scores in B2.*

Subscale	Mean Start	N	Mean Finish	N	Difference	t	p	Cohen's d
Seeking	4,19	86	4,41	55	0,22	-1,816	0,072	-0,296
Interpreting	4,66	86	4,65	55	-0,01	0,057	0,955	0,010
Using	4,36	86	4,28	55	-0,08	0,618	0,538	0,110
Providing	4,78	85	4,73	55	-0,05	0,496	0,621	0,085
Responding	5,03	86	5,03	55	0,00	0,029	0,977	0,005
Overall	4,63	86	4,59	55	-0,03	0,418	0,677	0,074

*p < .05. **p < .01.

Although students were extensively exposed to various feedback interventions, the Feedback Literacy Behaviour Scale did not show a clear increase across measurement moments. One possible explanation is that feedback literacy develops as a complex and gradual process, in which behavioral changes do not always translate into higher scores on self-report instruments. For example, students may engage more actively with feedback without necessarily recognizing or reporting this change themselves.

Observations provide a complementary perspective: across multiple interventions, students frequently indicated that they were "already doing this," particularly in relation to using rubrics or reflecting on their work. One B2 student, for example, described the rubric exercise as "a waste of my time, because I already write down for myself what I need to do, so now it just feels like double work," suggesting that the intervention was perceived as redundant. Closer observation revealed that student indeed made comparisons in order to generate feedback prior to the intervention. However, this process often lacked making the feedback explicit. According to Nicol (2021), this step is crucial for the generation of internal feedback. Explicit exercises during the intervention, such as translating rubric criteria into checklists or articulating concrete action points, required students to slow down and engage more deliberately with quality standards, thereby making feedback explicit. One student wrote in the reflection after a rubric exercise:

> I believe that this activity certainly contributed to a better final product, especially because I had to translate my feedback points into action points. This made it clear to me what I needed to work on, and I was ultimately able to complete these action points.

While the scale aligns with feedback-related behavior, it measures this behavior at a relatively general level. Subtle changes in specific feedback practices (such as more explicitly formulating action points after receiving feedback) may therefore remain undetected.

In the focus groups at the end of the interventions, students did discuss having a better understanding of the importance of feedback and how to use it. One student mentioned: "I've become more aware of it. I don't feel like anything has consciously changed, but I think I can process it better in my mind and handle it more effectively. (it referencing to feedback)".

Multiple students said that because they were forced to think deeper about the feedback, they felt like they know better how to use the different sources offered. This indicates that, although the quantitative data did not show a clear increase in feedback literacy, students do seem better able to generate their own feedback.

Appreciation of feedback sources and interventions

For both Bachelor 1 (B1) and Bachelor 2 (B2), changes in students' appreciation of feedback sources were examined between the baseline and final measurement (Tables 6 and 7). Across both cohorts, individual written teacher feedback remained the most highly valued feedback source, both before and after the interventions. The findings therefore suggest that the interventions did not immediately reduce students' reliance on individual teacher feedback. The reference for individual teacher feedback was also reflected in students' qualitative responses. One student stated during the third (rubric) intervention assignment

that “feedback that is useful to me comes from teachers or possibly from friends, not from myself,” illustrating a predominantly external orientation toward feedback.

At the same time, other students articulated a more gradual shift in their appreciation of the feedback-oriented assignments. One student explicitly reflected on their engagement during the same intervention assignment:

> I did not invest enough time in this, but I now notice, for example after completing the rubric assignment we have just submitted, that this type of assignment can actually be quite useful. In the future, I would therefore like to take this type of assignment more seriously.

This reflection suggests that students may not immediately recognize the value of feedback interventions, particularly when initial engagement is superficial or time-constrained. Instead, the perceived usefulness of such assignments appears to emerge through experience and retrospective reflection. This finding indicates that the development of feedback literacy may require repeated exposure and opportunities for reflection before students begin to internalize the purpose and benefits of these practices. This observation aligns with the literature, which indicates that students gradually become more skilled at obtaining and processing feedback as they progress through their studies (Carless, 2019; Zhang et al., 2023) and that their capacity for self-regulated learning improves over the course of their degree (Higgins et al., 2023). This indicates that students may need sustained practice and scaffolding over time before they begin to recognize the value of such interventions, be more able to generate their own feedback and become less dependent on teacher feedback.

At the same time, the results indicate that changes in students’ appreciation of other feedback sources were closely related to how these sources were implemented within the interventions. Feedback sources embedded in classroom activities and supported by interaction with teachers and peers tended to be valued more positively or remained stable over time, whereas sources requiring predominantly independent use showed less consistent or declining appreciation. AI-generated feedback illustrates this pattern clearly. In Bachelor 1, where AI-generated feedback was explicitly included in the intervention, appreciation increased significantly (table 5). In Bachelor 2, where AI-generated feedback was not offered, appreciation remained stable or slightly declined (table 6). The increase in appreciation of AI-generated feedback in Bachelor 1 underscores the importance of explicit introduction and guidance for supporting SRL (Dignath & Veenman, 2020; Eggers et al., 2025) and generating relevant feedback (Hornstein et al., 2025).

General teacher feedback delivered via webcasts increased in appreciation in both cohorts, reaching statistical significance in Bachelor 2 (table 6). The findings suggest that providing

feedback in an interactive classroom context enhances its perceived usefulness, particularly when students can discuss it and ask questions. This was illustrated by one student, who completed the final assignment of this module with a grade of 8 and wrote in a reflection form: “I experienced the assignment positively, it was nice to review the general feedback in class and receive additional explanations from the teacher and other students”. This highlights that in-class dialogue and guidance can strengthen students’ engagement with feedback and support deeper understanding. This pattern aligns with literature emphasizing the importance of scaffolding and dialogue in enabling students to interpret and act on feedback. For example, Jin et al. (2024) report that, in the co-design of a feedback analytics tool with students, participants explicitly highlighted the importance of opportunities for communication with teachers when engaging with feedback information. In addition, prior research shows that not only dialogue with teachers but also dialogue with peers can enhance the quality of feedback that students generate (Chi, Roy, & Hausmann, 2008; Nicol, 2021).

In contrast, appreciation for written peer feedback decreased significantly in both Bachelor 1 and Bachelor 2. Students associated this decline with variability in the quality of peer feedback and differences in peers’ engagement with the tasks. Observations from a first-year focus group illustrate this:

> Sometimes it is really pointless. I have even received comments where it said ‘I have to complete my three comments,’ so in that respect, it is sometimes really pointless. But if you are matched with the right person, it can be helpful.

Similarly, rubrics, although included in both interventions, did not become more positively valued. Their perceived usefulness depended strongly on the specificity of the criteria; insufficiently detailed rubrics hindered accurate self-assessment. A first-year Research Lab student reflected in an individual interview after completing the interventions independently:

> That rubric that was included. Yes, it said something like clear, that you had to do something and it had to be clearly explained. But then I start overthinking, yes, what is clear? What do I consider clear? What does the teacher consider clear? I found it difficult to estimate to what extent my assignment matched the rubric.

Together, these insights suggest that both peer feedback and rubrics can support evaluative judgement and self-assessment, but their effectiveness depends on the quality of peer contributions, the clarity of rubric criteria, and students’ readiness to engage thoughtfully with the task. This aligns with literature indicating that active engagement with feedback processes fosters evaluative judgement—the ability to make decisions about the quality of one’s own and others’ work—which in turn deepens students’ awareness of quality standards and the complexities involved in interpreting feedback (Tai et al., 2018).

Finally, a broader decline in appreciation of several feedback sources was observed in Bachelor 1, including academic literature and learning objectives. Given that these students completed the baseline measurement at the very start of their program, this pattern likely reflects a recalibration of expectations as students gained experience with feedback practices in higher education.

Table 6: *Independent Sample T-test appreciation of sources/interventions in B1*.

Source	**Mean S**	**N**	**Mean E**	**N**	**Difference**	**t**	**p**	**Cohen's d**
Published scientific articles	4,28	43	3,83	77	-0,45	2,378	0,019*	0,453
Task goals/intended learning outcomes	4,12	41	3,16	69	-0,96	4,788	<0,001**	0,892
Rubric, assessment form, criteria	4,61	41	4,39	71	-0,22	1,351	0,180	0,265
Exemplars (from peers)	4,39	41	4,42	71	0,03	-0,21	0,838	-0,040
Written individual teacher comments	4,73	40	4,62	71	-0,11	0,671	0,504	0,113
Written general teacher comments	4,08	40	4,01	71	-0,06	0,37	0,712	0,073
General feedback of teachers during lectures	3,88	41	3,84	70	-0,04	0,2	0,842	0,039
General feedback of teachers in a webcast	3,66	41	3,77	69	0,11	-0,67	0,502	-0,133
Written peer feedback	3,90	39	3,34	70	-0,55	2,771	0,003**	0,554
Work of fellow students	3,40	40	3,43	69	0,03	-0,18	0,861	-0,035
Discussions/ conversations with the teacher	4,10	40	4,03	67	-0,07	0,431	0,667	0,086
Discussions/ conversations with the fellow students	3,80	40	3,62	66	-0,18	1,073	0,286	0,215
Exercises made in the classroom	3,72	39	3,47	70	-0,25	1,22	0,225	0,024
Video's containing general instruction	3,80	41	3,79	71	-0,02	0,113	0,910	0,022
AI-generated feedback	2,93	41	3,40	62	0,48	2,098	0,040*	-0,445
Feedback of others outside your studies	3,24	41	3,25	64	0,01	-0,03	0,978	-0,006

*p < .05. **p < .01.

Table 7: *Independent Sample T-test appreciation of sources/interventions in B2.*

Source	Mean S	N	Mean E	N	Difference	t	p	Cohen's d
Published scientific articles	3,94	78	3,84	51	-0,09	0,491	0,624	0,694
Task goals/intended learning outcomes	3,06	77	3,10	49	0,04	-0,194	0,846	1,062
Rubric, assessment form, criteria	4,58	77	4,58	48	0,00	0,007	0,994	0,148
Exemplars (from peers)	4,48	77	4,54	48	0,06	-0,494	0,622	-0,261
Written individual teacher comments	4,83	77	4,87	47	0,04	-0,505	0,615	0,068
Written general teacher comments	3,71	77	3,81	47	0,09	-0,580	0,564	0,015
General feedback of teachers during lectures	3,62	77	3,81	47	0,19	-1,188	0,238	-0,109
General feedback of teachers in a webcast	3,44	77	3,79	48	0,35	-2,167	0,032*	-0,154
Written peer feedback	3,27	77	3,17	48	-0,11	0,498	0,619	0,539
Work of fellow students	3,42	77	3,33	48	-0,08	0,418	0,677	-0,077
Discussions/ conversations with the teacher	4,13	75	4,26	47	0,12	-0,840	0,403	0,064
Discussions/ conversations with the fellow students	3,45	75	3,77	47	0,31	-2,046	0,043*	0,327
Exercises made in the classroom	3,18	77	3,46	48	0,28	-1,379	0,171	0,019
Video's containing general instruction	3,42	76	3,77	48	0,35	-1,874	0,063	-0,125
AI-generated feedback	3,18	66	3,05	41	-0,13	0,715	0,476	-0,322
Feedback of others outside your studies	2,91	74	2,83	42	-0,07	0,344	0,732	0,162

*p < .05. **p < .01.

The comparison between control and experimental groups, using independent t-tests (table 8), largely confirms the earlier findings. Feedback sources that were explicitly scaffolded within the interventions, such as AI-generated feedback and general feedback from teachers in webcasts, remained stable or increased in appreciation in the experimental group, while the control group often showed significant declines. AI-generated feedback in particular,

was rated significantly higher in the experimental group (medium effect), whereas the increase in the control group was small and non-significant.

At the same time, written peer feedback decreased in appreciation within the experimental group, while remaining stable in the control group, highlighting the dependency on feedback quality. Rubrics showed no significant change in the experimental group, whereas the control group reported a slight increase, indicating that perceived value depends on clarity and usability.

Table 8: *Independent sample T-test appreciation of feedback sources or interventions for control and experimental group.*

Source	**E/C**	**Mean S**	**N**	**Gem F**	**N**	**Difference**	**t**	**p**	**Cohen's d**
Published scientific articles	C	3,99	176	3,88	100	-0,11	0,847	0,398	0,107
	E	4,28	43	3,83	77	-0,45	2,334	0,022*	0,453
Task goals/intended learning outcomes	C	3,24	158	3,09	93	-0,15	1,050	0,295	0,138
	E	4,12	41	3,16	69	-0,96	4,526	0,000**	0,892
Rubric, assessment form, criteria	C	4,26	157	4,49	94	0,23	-1,958	0,052	-0,252
	E	4,61	41	4,39	71	-0,22	1,484	0,141	0,265
Exemplars (from peers)	C	4,51	158	4,39	94	-0,11	1,091	0,277	0,144
	E	4,39	41	4,42	71	0,03	-0,208	0,835	-0,040
Written individual teacher comments	C	4,55	155	4,62	93	0,08	-0,679	0,498	-0,091
	E	4,73	40	4,62	71	-0,11	0,687	0,494	0,133
Written general teacher comments	C	3,86	156	3,67	93	-0,19	1,515	0,132	0,199
	E	4,08	40	4,01	71	-0,06	0,383	0,702	0,073
General feedback of teachers during lectures	C	3,93	156	3,59	94	-0,34	2,849	0,005**	0,377
	E	3,88	41	3,84	70	-0,04	0,202	0,840	0,039
General feedback of teachers in a webcast	C	3,69	153	3,41	93	-0,28	2,295	0,023*	0,303
	E	3,66	41	3,77	69	0,11	-0,674	0,502	-0,133
Written peer feedback	C	3,33	153	3,21	92	-0,13	0,842	0,401	0,112
	E	3,90	39	3,34	70	-0,55	2,771	0,007**	0,554
Work of fellow students	C	3,41	155	3,46	93	0,06	-0,433	0,665	-0,057
	E	3,40	40	3,43	69	0,03	-0,179	0,859	-0,035
	C	4,13	153	4,01	91	-0,12	1,033	0,303	0,141

Discussions/ conversations with the teacher	E	4,10	40	4,03	67	-0,07	0,446	0,656	0,086
Discussions/ conversations with the fellow students	C	3,70	155	3,45	92	-0,25	2,229	0,027*	0,293
	E	3,80	40	3,62	66	-0,18	1,077	0,284	0,215
Exercises made in the classroom	C	3,75	157	3,17	94	-0,58	3,795	0,000**	0,502
	E	3,72	39	3,47	70	-0,25	1,213	0,229	0,244
Video's containing general instruction	C	3,85	156	3,43	93	-0,42	3,162	0,002**	0,414
	E	3,80	41	3,79	71	-0,02	0,114	0,910	0,022
AI-generated feedback	C	2,93	120	3,14	79	0,21	-1,354	0,178	-0,191
	E	2,93	41	3,40	62	0,48	-2,211	0,029*	-0,445
Feedback of others outside your studies	C	3,14	134	2,99	90	-0,15	1,058	0,292	0,144
	E	3,24	41	3,25	64	0,01	-0,028	0,978	-0,006

*p < .05. **p < .01.

Academic performance: comparison between groups and cohorts

To examine whether participation in the interventions was associated with improved academic performance, students' grades were analyzed. A mixed ANOVA comparing grades in B1 and B2 between the experimental group and the control group (table 9) revealed no significant main effect of time, ($F(1, 159) = 0.022$, $p = 0.881$), indicating that, on average, students did not score higher in B2 than in B1 (table 8). No significant main effect of group was found either, ($F(1, 159) = 3.551$, $p = 0.061$), and the interaction between time and group was also non-significant, ($F(1, 159) = 0.343$, $p = 0.559$), suggesting that the change in grades from B1 to B2 did not differ between the experimental and control groups.

Table 9: *Estimated marginal means (EMMs) for B1 and B2 grades by group and mixed-design ANOVA results*

Group	**Time**	**M**	**SE**	**95% CI Lower**	**95% CI Upper**
Control (0)	B1	6.561	0.079	6.405	6.718
Control (0)	B2	6.526	0.069	6.390	6.662
Experimental (1)	B1	6.701	0.074	6.555	6.848
Experimental (1)	B2	6.722	0.064	6.596	6.849

However, a different picture emerged when the grades of the experimental B2 group was compared with the cohort from the previous academic year (table 10). Students in the experimental group achieved significantly higher grades in B2 than students from the previous cohort. Although the effect size was small (Cohen's d = 0.33), this result suggests that the experimental group reached a higher average end level than the earlier cohort that did not receive these interventions. This pattern may indicate that the interventions contribute more to consolidating or maintaining a higher final level than to additional growth relative to the starting point.

Table 10: *Comparison of mean B2 grades between the experimental group and the control group*

Group	**N**	**M**	**SD**	**t(DF)**	**p**	**Cohen's d**
Control group B2	75	6.53	0.59	-2.09(159)	.038*	0.33
Experimental group B2	86	6.72	0.59			

*p < .05. **p < .01.

On the other hand, the experimental group also achieved higher grades in B1, suggesting that this cohort may simply have been stronger in skills education than the control group. The fact that the experimental group started from a higher B1 grade may have influenced the absence of significant differences in growth between the experimental and control groups. This can partly be explained by methodological characteristics of growth measures. Difference scores (B2 – B1) are sensitive to measurement error and are strongly influenced by the starting level. Students who already scored relatively high in B1 had less room for improvement, which may have resulted in a ceiling effect.

At the same time, the comparison with the previous cohort shows that students in the experimental group reached a higher B2 level on average. This suggests that the interventions may not necessarily lead to additional growth, but rather contribute to the maintenance and consolidation of performance, or to the prevention of decline. From this perspective, the interventions can be seen as stabilizing, supporting students in sustaining and refining their skills over time. This interpretation is reinforced by students' own experiences, as similar statements were made frequently throughout the evaluations. Quite some students indicated that the activities helped them to improve the quality of their final products and to engage more consciously with feedback and revision. As one student, who improved from an average of 5.9 in B1 to 6.6 in B2, explained:

> The activity definitely contributed to a better final product, because it forced me to look at my work in a systematic way and actively work on improvements. The process of incorporating feedback and revising helped me become more aware of reflection and analysis, which I can apply in future assignments.

This indicates that students themselves also feel that these assignments help them improve their final product, and consequently their final grade.

Role of engagement and interaction with the assignments

Within the experimental group, further analyses examined whether the way students engaged with the assignments was related to their performance. Regression analyses with growth from B1 to B2 as the dependent variable showed no significant effects. Neither the number of completed assignments, nor the degree to which students reported completing the assignments seriously, nor their positive attitude towards the assignments was associated with growth relative to the starting level.

However, when examining the final level (mean B2 score), a clearer pattern emerged. The regression model was significant and explained approximately 12–13% of the variance in B2 scores. In particular, the seriousness with which students completed the assignments emerged as a significant and relatively strong predictor of higher B2 scores (table 11). Simply completing more assignments or holding a positive attitude towards them was not significantly related to the final level. This pattern remained consistent both when the group assignment was included and when it was excluded, indicating that deep cognitive processing is more important than superficial participation.

Table 11: *Regression analysis of factors related to B2 scores in the experimental group (N = 86)*

Predictor	B	SE B	β	t	p
(Constant)	4.695	0.902	—	5.205	<.001**
Mean_completed	-0.715	0.700	-0.239	-1.022	.310
Mean_serious	1.369	0.675	0.498	2.027	.046*
Mean_positive	0.063	0.067	0.108	0.944	.348

*p < .05. **p < .01.

Note. Dependent variable: Mean_B2. Model: $F(3, 82) = 4.21$, $p = .008$, $R^2 = .134$, Adjusted $R^2 = .102$.

From a SRL perspective, this suggests that students who actively plan, monitor, and reflect during the assignments are more likely to benefit from the feedback interventions. Merely completing assignments without in-depth reflection appears insufficient to achieve learning gains. This aligns with previous research showing that feedback is only effective when students actively interpret it and make the feedback explicit (Nicol 2019; 2021; Nicol & McCallum 2022).

Survey data indicate that students generally evaluate feedback sources and interventions positively, but the data also suggest that the effectiveness of these interventions depends on students' engagement. This variation likely explains the relatively small effects observed at the group level, as only a subset of students engaged seriously with the interventions. Some students may require additional time to internalize these practices, as generating internal feedback involves practice (Nicol, 2021; Tai et al., 2018). Consequently, some effects of the intervention may take time to become visible.

Additionally, differences in implementation by instructors, despite detailed guidelines, may have influenced the consistency and intensity of the interventions, diluting their overall impact. Observational and quantitative findings converge to suggest that feedback interventions are most effective for students who engage actively and seriously. These results emphasize the need not only to offer feedback-oriented assignments but also to explicitly support students in developing deeper engagement and reflective practices to maximize the benefits of feedback interventions.

Conclusion

Taken together, the literature demonstrates that feedback literacy, SRL, quality awareness and active reflective practice are fundamentally interdependent processes that mutually reinforce one another. Effective learning requires that students not only *receive* feedback, but also develop the capacity to *interpret*, *compare*, and *make it explicit* (Nicol, 2019, 2021; Nicol & McCallum, 2022). Research consistently shows that students strengthen their self-regulatory skills when they engage in structured comparison activities, such as analyzing exemplars, applying rubrics, conducting peer reviews, or generating self-feedback, because these tasks provide explicit criteria against which they can judge their own performance (Panadero et al., 2023; Tai et al., 2018). This act of comparing current performance to a clearly defined standard is also the cornerstone of quality awareness, enabling students to understand what "good work" looks like and how their own work aligns with that norm (Tai et al., 2018; Carless & Boud, 2018; Hattie & Timperley, 2007).

Overall, the results of our study suggest that feedback interventions contribute to students' development of feedback literacy and their engagement with learning, but the impact of our interventions was uneven and closely tied to how students interact with the tasks. While quantitative data showed little overall change in feedback literacy scores, qualitative and observational data indicate that many students deepened their understanding of feedback processes and became more capable of generating internal feedback. Appreciation of feedback sources varied, with teacher feedback remaining central, and other sources, such as rubrics, peer feedback, and AI-generated feedback, being valued more when offered

structured and supported. Academic performance patterns indicated that interventions might have helped maintain or consolidate achievement rather than drive uniform growth, with higher final performance could be associated with serious engagement. Taken together, these findings highlight that feedback interventions are most effective when they intersect with students' active, reflective, and sustained engagement in the learning process (Panadero, 2017; Dinsmore et al., 2008; Hattie & Timperley, 2007).

Based on the literature, it is important to acknowledge that the development of feedback literacy and evaluative judgment likely requires sustained practice over time (Zimmerman, 2002, 2008; Pintrich, 2000; Panadero & Lipnevich, 2022). The findings indicate that not all students fully internalized quality standards within the intervention period, confirming that feedback literacy and evaluative judgment require longitudinal development. Following the research of Carless (2020) and Higgins et al. (2023), we recommend that further research should adopt a long-term perspective to monitor how these skills evolve throughout an academic program and identify which interventions have the most lasting impact.

Building on insights from Bauer et al. (2025) and Zhan et al. (2025), we recommend further research to explore how feedback literacy and SRL shape students' ability to critically interpret and effectively use AI-generated feedback. While Bauer et al. highlight the importance of AI literacy and systematic implementation, Zhan et al. emphasize the interplay between feedback literacy and generative AI in fostering feedback engagement. These insights underscore the need to investigate how AI feedback can be designed to align with students' developmental needs, fostering deeper engagement and autonomy. Interventions should explicitly teach students how to critically interpret and integrate AI-generated feedback into their learning processes, ensuring that it complements, rather than replaces, their evaluative judgment and autonomy.

Finally, the study highlights the importance of designing feedback interventions that systematically develop students' evaluative judgment and quality awareness. By integrating SRL-supportive practices with explicit development of evaluative skills, educational design can better support students in becoming independent, reflective learners who are equipped to navigate diverse feedback sources, including emerging technologies like AI.

To activate these evidence-based mechanisms, we designed a toolbox that systematically combines structured feedback activities with support for self-regulation and evaluative skills. By guiding students to use various feedback sources (teacher feedback, rubrics, exemplars, peer feedback, AI-generated feedback) and by asking them to compare and reflect on their own work, the toolbox cultivates internal feedback generation and strengthens evaluative judgment. Through repeated practice, students learn to identify quality indicators, set goals, monitor their progress, and adapt their work accordingly. This

contributes not only to improved task performance but also to reduced dependence on teacher feedback, supporting students in becoming reflective autonomous learners, able to self-regulate based on a well-developed feedback literacy and a clear understanding of quality.

Practical recommendations for education

Based on the findings of this study, several practical recommendations for higher education can be formulated. First, research shows that self-regulated learning and generating internal feedback develops gradually and benefits from structured scaffolding (Nicol & McCallum, 2022; Panadero & Lipnevich, 2022; Pintrich, 2000; Zimmerman, 2002). In practice, this implies that feedback exercises should be introduced early in the curriculum within a structured classroom setting with clear instructions and active teacher guidance. As students' self-regulatory skills and feedback literacy develop, responsibility can gradually shift toward more independent engagement. In the second year, for example, exercises can remain mandatory but shift toward more independent execution where in the last year students can be able to select and use feedback tools autonomously.,

Second, collaboration and peer interaction also play a crucial role, but the study showed that peer feedback was often undervalued or even declined in appreciation when contributions lacked depth or clarity. When properly structured, however, peer discussions and collaborative activities supported students' evaluative judgment and understanding of quality standards, consistent with prior findings that active engagement with peers enhances feedback internalization and evaluative judgement (Nicol, 2021; Nicol & McCallum, 2022; Tai et al., 2018). Educators should therefore systematically organize peer feedback and group reflection sessions, providing clear criteria, modeling, and guided dialogue to ensure interactions are meaningful rather than superficial.

Third, the study highlighted the importance of introducing new feedback tools, such as AI-tools, within an explicit and supported context. Students engaged more positively with these resources when teachers connected them directly to performance standards and expectations, which corresponds with literature emphasizing the need for feedback and SRL to be aware of the goals, current performance, and next steps (Hattie & Timperley, 2007; Panadero, 2017). Consequently, new tools should initially be used with teacher guidance, gradually transitioning to independent use as students develop feedback literacy, supporting their capacity for self-regulation and internal feedback generation.

Fourth, the importance of clear quality standards in guiding students' engagement with feedback was underscored in this study. While teacher feedback remained highly valued,

other sources were only effective when explicitly connected to criteria and exemplars. This supports prior evidence that quality awareness directs self-regulatory processes and prevents feedback from remaining ambiguous (Sadler, 2010; Tai et al., 2018). More specifically, Sadler (2010) has emphasized that clarity about quality standards through exemplars, rubrics, and reflective dialogue enables students to engage in internal evaluation and improvement. Similarly, Tai et al. (2018) have argued that evaluative judgement, which requires understanding and applying quality standards, is essential for self-regulation and meaningful engagement with feedback. In practice, any alternative feedback source should be explicitly linked to standards and reflective dialogue to strengthen feedback literacy and support students in making meaningful use of the information provided.

Finally, the results emphasize the need for professional development for teachers. Variation in implementation influenced student engagement and the effectiveness of interventions, highlighting that feedback is most impactful when teachers create suitable environments and external comparison sources and provide guidance and coaching (Nicol, 2021; Carless & Boud, 2018). Training teachers in feedback literacy, both in giving actionable feedback and in designing feedback-rich learning environments, can enhance consistency, reduce student overreliance on individual comments, and support the development of students' internal feedback capacities.

Taken together, these findings suggest that embedding structured, scaffolded, and interactive feedback exercises within the curriculum, combined with professional teacher support, can promote meaningful engagement, foster self-regulation, and strengthen students' awareness of quality standards, ultimately supporting their long-term academic and professional development.

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Appendix A: Materials

In this toolbox, the following working materials are available:

	English	Dutch
Peer feedback	- Teacher instruction 'working with peer feedback' - Form 'working with peer feedback' – in class - Form 'working with peer feedback' – automated - Feedback form peer feedback – in class - Feedback form peer feedback - duo	- Docentinstructie 'werken met peerfeedback' - Invulformulier 'werken met peerfeedback' – klassikaal - Invulformulier 'werken met peerfeedback' – geautomatiseerd - Feedbackformulier peerfeedback – klassikaal - Feedback form peerfeedback - duo
General (teacher) feedback	- Teacher instruction 'general feedback' - Form 'general feedback'	- Docentinstructie 'algemene feedback' - Invulformulier 'algemene feedback'
Rubric-guided self-assessment	- Teacher instruction 'working with a rubric' - Form 'working with a rubric	- Docentinstructie 'werken met een rubric' - Invulformulier 'werken met een rubric'
Exemplars	- Teacher instruction 'working with exemplars' - Placemat 'working with exemplars' - Form 'working with exemplars' – in class - Form 'working with exemplars' - individual	- Docentinstructie 'werken met voorbeelden' - Placemat 'werken met voorbeelden' - Invulformulier 'werken met voorbeelden' - klassikaal - Invulformulier 'werken met voorbeelden' - individueel
AI-generated feedback	- Teacher instruction 'generating feedback with AI' - Form 'generating feedback with AI' – in class - Form 'generating feedback with AI' - individual	- Docentinstructie 'feedback genereren met AI' - Invulformulier 'feedback genereren met AI' – klassikaal - Invulformuier 'feedback genereren met AI - individueel
Feedback dialogue based on teacher feedback	- Teacher instruction 'feedback dialogue' - Process map 'feedback dialogue'	- Docentinstructie 'feedbackdialoog' - Proceskaart feedbackdialoog

	- Form 'feedback dialogue' – in class - Form 'feedback dialogue' - individual	- Invulformulier 'feedbackdialoog' – klassikaal - Invulformulier 'feedbackdialoog' - individueel

Appendix B: Questionnaire (in Dutch)

* The section “opdrachten” was included only in the questionnaire at the end of the research period, the other sections were included in all questionnaires.

Enquête feedback

Beste studenten, Welkom bij deze afsluitende enquête, die is opgesteld in het kader van het CLI-fellowship. In dit collegejaar zijn verschillende opdrachten aangeboden waarmee jullie zelf feedback konden genereren. Bedankt voor jullie medewerking daarbij, die van onschatbare waarde is voor ons onderzoek waarmee we hopen in kaart te kunnen brengen welke interventies de student beter in staat stelt om zelf feedback te creëren. Hierop hebben wij al verschillende geluiden ontvangen, maar voor onze dataverzameling is een eerlijk ingevulde enquête ook van grote toegevoegde waarde.

De vragen in deze enquête gaan over handelingen die jullie uitvoeren binnen het feedbackproces en over hoe jullie verschillende de feedbackbronnen en opdrachten waarderen. Heel fijn dus als jullie deze enquête zouden willen invullen! De enquête wordt anoniem verwerkt en vertrouwelijk behandeld en met het invullen van de enquête geven jullie ons toestemming voor het verzamelen, bewaren en gebruiken van de gegevens voor ons onderzoek.

De enquête zal ongeveer 10 minuten van jullie tijd in beslag nemen. We waarderen jullie tijd en betrokkenheid bij dit onderzoek ten zeerste. Dank jullie wel voor jullie deelname!

Leeftijd

Hoe oud ben je?

_____

Vooropleiding
Welke vooropleiding heb je gevolgd?

- ○ VWO
- ○ HBO
- ○ WO
- ○ Anders, namelijk: _____

Studie
Welke studie volg je op dit moment?

- ☐ Criminologie
- ☐ Rechtsgeleerdheid
- ☐ Fiscaal recht

Tijd voor studie
Sinds wanneer sta je voor deze studie ingeschreven? (Mocht je beide studies volgen, ga dan uit van de eerste studie)

- ○ Voor 2021
- ○ 2021
- ○ 2022
- ○ 2023

Beoordeling algemeen
Welke van onderstaande opties beschrijft het best jouw gemiddelde in deze studie?

- ○ Onvoldoende
- ○ Voldoende
- ○ Goed
- ○ Niet zeker

Beoordeling vaardighedenonderwijs
Welke van onderstaande opties beschrijft het best jouw gemiddelde voor het vaardighedenonderwijs?

- ○ Onvoldoende
- ○ Voldoende
- ○ Goed
- ○ Niet zeker

Deelname onderzoek
Heb je actief deelgenomen aan het onderzoek in de B1?

- ☐ Ja, ik was onderdeel van de CLI-groep die ieder blok een opdracht heeft gemaakt.
- ☐ Ja, ik heb een feedback opdracht gemaakt in blok 1.6 (JAV: opdracht om docentenfeedback te interpreteren)
- ☐ Ja, ik heb een feedbackopdracht gemaakt in blok 1.8 (Criminaliteit en Samenleving: opdracht met het vergelijken van voorbeelden)
- ☐ Nee, ik heb geen opdrachten gemaakt in B1

Feedbackgeletterdheid

Denk bij de volgende serie vragen na over wat jij normaal gesproken in jouw studie doet, en geef een score aan hoe vaak je dit doet.

Zoeken naar feedback

	Nooit	Vrijwel nooit	Niet vaak	Soms	Vaak	Altijd
Ik reflecteer op de kwaliteit van mijn eigen werk en gebruik mijn reflectie als een bron van informatie om mijn werk te verbeteren.	○	○	○	○	○	○
Ik zoek voorbeelden van goed werk om mijn eigen werk te verbeteren.	○	○	○	○	○	○
Wanneer andere mensen mij input geven over mijn werk, luister of lees ik aandachtig.	○	○	○	○	○	○
Ik vraag om feedback over specifieke aspecten van mijn werk.	○	○	○	○	○	○

Interpreteren van feedback

	Nooit	Vrijwel nooit	Niet vaak	Soms	Vaak	Altijd
Ik denk zorgvuldig na over de feedback op mijn werk, voordat ik besluit het wel of niet te gebruiken.	○	○	○	○	○	○
Wanneer ik uit verschillende bronnen tegenstrijdige informatie ontvang over mijn werk, beoordeel ik wat ik zal gebruiken.	○	○	○	○	○	○
Bij het beslissen wat ik met feedback moet doen, overweeg ik de geloofwaardigheid van de bronnen.	○	○	○	○	○	○
Ik overweeg hoe de feedback verband houdt met criteria of standaarden.	○	○	○	○	○	○

Gebruiken van feedback

	Nooit	Vrijwel nooit	Niet vaak	Soms	Vaak	Altijd
Ik controleer of mijn werk verbeterd is, nadat ik de feedback heb toegepast.	○	○	○	○	○	○
Ik gebruik feedback op mijn werk om mijn begrip van wat kwalitatief goed werk is te verfijnen.	○	○	○	○	○	○
Wanneer ik feedback ontvang, denk ik na over hoe ik dit kan gebruiken bij toekomstig werk, en niet enkel bij de gemaakte opdracht.	○	○	○	○	○	○
Ik bewaar feedback op eerder werk om dit in de toekomst opnieuw te gebruiken.	○	○	○	○	○	○
Wanneer ik feedback van anderen ontvang, gebruik ik dit om te verbeteren waar ik mee bezig ben.	○	○	○	○	○	○

Geven van feedback

	Nooit	Vrijwel nooit	Niet vaak	Soms	Vaak	Altijd
Wanneer ik feedback geef op het werk van anderen, geef ik opbouwende kritiek.	○	○	○	○	○	○
Ik geef feedback op het werk van anderen, als daarom gevraagd wordt.	○	○	○	○	○	○
Wanneer ik feedback geef op het werk van anderen, verwijs ik naar standaarden of criteria.	○	○	○	○	○	○
Ik bied aan om feedback te geven op het werk van mijn medestudenten.	○	○	○	○	○	○
Ik probeer heel duidelijk te zijn bij het geven van feedback aan anderen.	○	○	○	○	○	○

Reageren op feedback

	Nooit	Vrijwel nooit	Niet vaak	Soms	Vaak	Altijd
Ik sta open voor redelijke kritiek op mijn werk.	○	○	○	○	○	○
Ik kan goed omgaan met negatieve emoties die ik heb na het ontvangen van feedback.	○	○	○	○	○	○
Wanneer de feedback waardevol is maar het mij van streek maakt of vervelend voelt, vind ik nog steeds een manier om er gebruik van te maken.	○	○	○	○	○	○
Kritische feedback motiveert mij om mijn werk te verbeteren.	○	○	○	○	○	○
Ik maak gebruik van kritische feedback, ook al is het lastig om dit te ontvangen.	○	○	○	○	○	○

Bronnen van feedback

Denk bij de volgende serie vragen na over de bronnen van feedback die jij bent tegengekomen in jouw studie:

Waardering van feedbackbronnen

	Zeer bruikbaar	Enigszins bruikbaar	Niet bruikbaar en niet onbruikbaar	Enigszins onbruikbaar	Zeer onbruikbaar	N.v.t.
Vakliteratuur	○	○	○	○	○	○
Vakdoelstellingen	○	○	○	○	○	○
Rubric, beoordelingsformulier en/of (succes)criteria	○	○	○	○	○	○
Voorbeelden	○	○	○	○	○	○
Schriftelijke individuele feedback van docenten	○	○	○	○	○	○
Schriftelijke algemene feedback van docenten	○	○	○	○	○	○
Algemene feedback van docenten tijdens bijeenkomsten	○	○	○	○	○	○
Algemene feedback in een webcast	○	○	○	○	○	○
Schriftelijke peerfeedback	○	○	○	○	○	○
Werk van medestudenten	○	○	○	○	○	○
Discussie met de docent	○	○	○	○	○	○
Discussie met medestudenten	○	○	○	○	○	○

Oefeningen tijdens de bijeenkomsten	○	○	○	○	○	○
Webcasts, kennisclips, etc.	○	○	○	○	○	○
Gegenereerde feedback door AI	○	○	○	○	○	○
Feedback van anderen buiten de studie	○	○	○	○	○	○

Opdrachten

Geef bij de volgende serie vragen aan hoe je de opdrachten hebt gewaardeerd.

	Zeer bruikbaar	Enigszins bruikbaar	Niet bruikbaar en niet onbruikbaar	Enigszins onbruikbaar	Zeer onbrukbaar	N.v.t.
Algemene feedback	○	○	○	○	○	○
Peerfeedback	○	○	○	○	○	○
Rubric	○	○	○	○	○	○
Voorbeelden (vrijwillig)	○	○	○	○	○	○
Rubric	○	○	○	○	○	○

Extra opmerkingen

Mocht je verder nog feedback hebben of iets kwijt willen over de opdrachten, dan is daar hieronder de ruimte voor.

_____
_____
_____
_____

Appendix C: Questionnaire (in English)

* The section “assignments” was included only in the questionnaire at the end of the research period, the other sections were included in all questionnaires.

Dear students,

Welcome to this final survey, developed within the framework of the CLI fellowship. During this academic year, several assignments were offered that enabled you to generate feedback yourself. Thank you for your participation; this is invaluable for our research, through which we aim to identify which interventions better support students in generating their own feedback.

We have already received various impressions, but for our data collection, an honestly completed survey is of great added value. The questions in this survey concern actions you undertake within the feedback process and how you value different feedback sources and assignments. We would greatly appreciate it if you would complete this survey.

The survey will be processed anonymously and treated confidentially. By completing the survey, you give consent for the collection, storage, and use of the data for our research purposes. The survey will take approximately 10 minutes to complete.

We sincerely appreciate your time and involvement in this research. Thank you for your participation.

Age
How old are you?

_____

Previous education

What type of prior education have you completed?

- ○ VWO (pre-university secondary education)
- ○ HBO (University of applied sciences)
- ○ WO (research university)
- ○ Other, namely: _____

Programme

Which programme are you currently enrolled in?

- ☐ Criminology
- ☐ Law
- ☐ Tax law

Duration of study

Since when have you been enrolled in this programme?
(If you are enrolled in two programmes, please refer to the first programme)

- ○ Before 2021
- ○ 2021
- ○ 2022
- ○ 2023

Overall acadamic performance

Which of the following best describes your average grade in this programme?

- ○ Inadequate
- ○ Sufficient
- ○ Good
- ○ Not sure

Performance skills educations

Which of the following best describes your average grade for Skills Education?

- ○ Inadequate
- ○ Sufficient
- ○ Good
- ○ Not sure

Participation in the study

Did you actively participate in the study in Year 1 (B1)?

☐ Yes, I was part of the CLI group that completed an assignment each block.

☐ Yes, I completed a feedback assignment in block 1.6 (JAV: interpreting teacher feedback).

☐ Yes, I completed a feedback assignment in block 1.8 (Crime and Society: comparing examples).

☐ No, I did not complete any assignments in B1.

Feedback Literacy

For the following series of questions, think about what you typically do in your studies and indicate how often you do this.

Seek feedback information

	Never	Almost never	Not often	Sometimes	Often	Always
I reflect on the quality of my own work and use my reflection as a source of information to improve my work.	○	○	○	○	○	○
I seek out examples of good work to improve my work.	○	○	○	○	○	○
When other people provide me with input about my work I listen or read thoughtfully.	○	○	○	○	○	○
I ask for comments about specific aspects of my work.	○	○	○	○	○	○

Make sense of information

	Never	Almost never	Not often	Sometimes	Often	Always
I carefully consider comments about my work before deciding if I will use them or not.	○	○	○	○	○	○
When receiving conflicting information about my work from different sources, I make a judgement about what I will use.	○	○	○	○	○	○
When deciding what to do with comments, I consider the credibility of their sources.	○	○	○	○	○	○
I consider how comments relate to criteria or standards.	○	○	○	○	○	○

Use feedback information

	Never	Almost never	Not often	Sometimes	Often	Always
I check whether my work is better after I have acted on comments.	○	○	○	○	○	○
I use comments on my work to refine my understanding of what good quality work looks like.	○	○	○	○	○	○
When receiving comments I plan how I will use them to improve my future work, not just the immediate task.	○	○	○	○	○	○
I keep comments on previous work to use again in the future.	○	○	○	○	○	○
When I receive comments from others, I use them to improve what I'm working on at the time.	○	○	○	○	○	○

Provide feedback information

	Never	Almost never	Not often	Sometimes	Often	Always
PF3: When commenting on the work of others, I provide constructive criticism.	○	○	○	○	○	○
I comment on other people's work when I am invited to.	○	○	○	○	○	○
When commenting on other people's work I refer to standards or criteria.	○	○	○	○	○	○
I offer to provide feedback to my peers.	○	○	○	○	○	○
I try to be very clear when providing feedback comments to others.	○	○	○	○	○	○

Manage effect

	Never	Almost never	Not often	Sometimes	Often	Always
I am open to reasonable criticism about my work.	○	○	○	○	○	○
I deal well with any negative emotional responses I have to feedback information.	○	○	○	○	○	○
When a feedback message is valuable but upsetting or annoying, I still find a way to make use of it.	○	○	○	○	○	○
Critical comments motivate me to improve my work.	○	○	○	○	○	○
I make use of critical comments even if they are difficult to receive.	○	○	○	○	○	○

Feedback sources

For the following questions, think about the feedback sources you have encountered in your studies:

Appreciation of feedback sources

	Very useful	Somewhat useful	Neutal	Somewhat not useful	Not useful at all	N/A
Published scientific articles	○	○	○	○	○	○
Task goals/intended learning outcomes	○	○	○	○	○	○
Rubric, assessment form, criteria	○	○	○	○	○	○
Exemplars	○	○	○	○	○	○
Written individual teacher comments	○	○	○	○	○	○
Written general teacher comments	○	○	○	○	○	○
General feedback of teachers during lectures	○	○	○	○	○	○
General feedback of teachers in a webcast	○	○	○	○	○	○
Written peer feedback	○	○	○	○	○	○
Work of fellow students	○	○	○	○	○	○
Discussions/conversations with the teacher	○	○	○	○	○	○
Discussions/conversations with fellow students	○	○	○	○	○	○
Exercises made in the classroom	○	○	○	○	○	○
Video’s containing general instruction	○	○	○	○	○	○
Feedback generated by AI	○	○	○	○	○	○

Feedback of others outside your studies	○	○	○	○	○	○

Assignments

For the following questions, indicate how you valued the assignments.

	Zeer bruikbaar	Enigszins bruikbaar	Niet bruikbaar en niet onbruikbaar	Enigszins onbruikbaar	Zeer onbrukbaar	N.v.t.
General feedback	○	○	○	○	○	○
Peer feedback	○	○	○	○	○	○
Rubric	○	○	○	○	○	○
Examplars (voluntary)	○	○	○	○	○	○
Rubric	○	○	○	○	○	○

Additional comments

If you have any further feedback or would like to share anything about the assignments, please use the space below._____

_____

_____

_____

_____

Appendix D: Focus group guides (in Dutch)

Focusgroup guide before interventions

Doel: Inzicht krijgen in de waardering van externe bronnen.

Start:

- Uitleg onderzoek
- Invullen consentformulier
- Check invullen enquête.

Onderwerpen van het gesprek:

- Wat heb je geleerd van de verschillende bijeenkomsten? Welke oefening had je het meest aan en waarom?
- Welke feedbackbronnen gebruik je nu?
- Hoe waardevol vind je:

Uit: Nicol, D. (2021). The power of internal feedback: Exploiting natural comparison rocesses. Assessment & Evaluation in Higher Education, 46(5), 756-778. (Aangepaste bronnen voor ons onderzoek, gericht op de bronnen die wij aanbieden en het taalgebruik dat wij binnen de vakken gebruiken).

- Gepubliceerde (wetenschappelijke) teksten als voorbeeld
- Vakdoelstellingen
- Rubric/beoordelingsformulier of criteria
- Werk van medestudenten
- Voorbeelden
- Geschreven opmerkingen van medestudenten
- Geschreven opmerkingen van de docent
- Discussie met de docent
- Discussie met medestudenten
- Video's met algemene instructie

Extra:

- Algemene feedback van de docenten
- Oefeningen tijdens de bijeenkomsten
- Gegenereerde feedback door AI
- Of:
- Individuele feedback van de docent
- Peerfeedback

- Algemene feedback
- Voorbeeldartikelen
- Opdrachten tijdens de bijeenkomsten

- In hoeverre ga je zelf op zoek naar bronnen waarmee je feedback kunt genereren?
- Welke extra bronnen, die niet vanuit docenten worden aangereikt, gebruik je?
- Wat doe je met deze bronnen? Hoe geneer je nu zelf feedback? Wat doe je met deze informatie (notitie maken, etc.)?
- Hoe gebruik je feedback om uiteindelijk jouw werk te verbeteren?

Afsluitende focusgroep:
Hoe vind je dat je feedbackgeletterdheid is verbeterd is, en waar blijkt dat uit?

Focusgroup guide after interventions (specific for Research Lab)

Doel: Inzicht krijgen in de waardering van externe bronnen.
Start:

- Uitleg onderzoek
- Invullen consentformulier à Mondeling?
- Check invullen enquête.

Bespreken opdrachten
RL 1 opdrachten:

- Blok 2 (JAV module): Peerfeedback
- Blok 4 (JAV module): docentfeedback?
- Blok 5 (1C, interviewen): Algemene feedback in bijeenkomst
- Blok 7 (Voorbeelden)?

RL 2 opdrachten

- Blok 2 (theoretisch argumenteren): opdracht algemene feedback in de bijeenkomst à fijn om dit te expliciteren maar algemene feedback voelt minder waardevol
- Blok 3 (2C deel I): Peerfeedback (zelf, verplicht) à peerfeedback is fijn, maar deze opdracht zat op een voorbereidende opdracht ipv eindopdracht en dan voelt het als minder zinvol.
- Blok 4 (M&T II): Rubric à checklist maken voelde als dubbel werk maar vlak voor de eindopdracht alles nalopen was wel erg fijn en behulpzaam
- Blok 5 (2D SPSS): Voorbeelden (vrijwillig)

- Blok 6 (2C deel II): Rubric à Fijn want groepsopdracht, elkaar checken

Per opdracht:

- Wat vinden jullie van de opdracht?
- Welke aspecten vonden jullie fijn en welke minder?
- Hebben jullie effect gemerkt van de opdracht?
- Zie je de feedbackbron anders na het gebruik van de opdracht?
- Rangschikken opdrachten?

Feedbackbronnen

Vragen:

- Welke feedbackbronnen gebruik je nu?
- Hoe waardevol vind je deze?
- In hoeverre ga je zelf op zoek naar bronnen waarmee je feedback kunt genereren?
- Welke extra bronnen, die niet vanuit docenten worden aangereikt, gebruik je?
- Wat doe je met deze bronnen? Hoe geneer je nu zelf feedback? Wat doe je met deze informatie (notitie maken, etc.)?
- Hoe gebruik je feedback om uiteindelijk jouw werk te verbeteren?
- Wat mis je nog in de informatie over feedback? Wat zou je nodig hebben om nog beter feedback te kunnen gebruiken?
- Zijn er dingen veranderd in het afgelopen jaar qua feedback gebruik?

Feedbackbronnen lijst:

- Gepubliceerde (wetenschappelijke) teksten als voorbeeld
- Vakdoelstellingen
- Rubric/beoordelingsformulier of criteria
- Werk van medestudenten
- Voorbeelden
- Geschreven opmerkingen van medestudenten
- Geschreven opmerkingen van de docent
- Discussie met de docent
- Discussie met medestudenten
- Video’s met algemene instructie
- Algemene feedback van de docenten
- Oefeningen tijdens de bijeenkomsten
- Gegenereerde feedback door AI
- Individuele feedback van de docent

- Peerfeedback
- Algemene feedback
- Voorbeeldartikelen
- Opdrachten tijdens de bijeenkomsten

Afsluiting

- Hoe vind je dat je feedbackgeletterdheid is verbeterd is, en waar blijkt dat uit?
- Hoe zou je zelf feedback verwerkt willen zien in het onderwijs?

Appendix E: Focus group guides (in English)

Focusgroup guide before interventions

Aim

To gain insight into students' appreciation of external feedback sources.

Start

- Explanation of the study
- Completion of the consent form
- Check completion of the questionnaire

Topics for discussion

Use of feedback sources

- Which feedback sources do you currently use?
- How valuable do you consider the following sources?

Based on:

Nicol, D. (2021). *The power of internal feedback: Exploiting natural comparison processes*. Assessment & Evaluation in Higher Education, 46(5), 756–778.

(The list was adapted for the present study, focusing on the feedback sources offered in the interventions and the terminology used within the courses.)

- Published (scientific) texts as examples
- Course learning objectives
- Rubrics / assessment forms or criteria
- Work of fellow students
- Examples
- Written comments from fellow students
- Written comments from the teacher
- Discussions with the teacher
- Discussions with fellow students
- Videos with general instruction

Additional sources

- General feedback from teachers
- Exercises during class sessions
- AI-generated feedback

Alternatively

- Individual feedback from the teacher

- Peer feedback
- General feedback
- Sample articles
- In-class assignments

Feedback-seeking and use

- To what extent do you actively search for sources to generate feedback?
- Which additional sources, not provided by teachers, do you use?
- What do you do with these sources? How do you currently generate your own feedback? What do you do with this information (e.g., making notes)?
- How do you use feedback to ultimately improve your work?

Closing focus group

- To what extent do you feel your feedback literacy has improved, and what indicates this improvement?

Focusgroup guide after interventions (specific for Research Lab)

Aim

To gain insight into students' appreciation of external feedback sources.

Start

- Explanation of the study
- Completion of the consent form → orally?
- Check completion of the questionnaire

Discussion of assignments

RL 1 assignments

- Block 2 (JAV module): Peer feedback
- Block 4 (JAV module): Teacher feedback?
- Block 5 (1C, interviewing): General feedback during a class session
- Block 7: Examples?

RL 2 assignments

- Block 2 (theoretical argumentation): General feedback assignment during the class session → helpful to make this explicit, but general feedback felt less valuable

- Block 3 (2C Part I): Peer feedback (self-generated, compulsory) → peer feedback was helpful, but because the assignment was linked to a preparatory task rather than the final assignment, it felt less meaningful
- Block 4 (M&T II): Rubric → creating a checklist felt like duplicate work, but reviewing everything just before the final assignment was very helpful
- Block 5 (2D SPSS): Examples (voluntary)
- Block 6 (2C Part II): Rubric → helpful because it was a group assignment, allowing students to check each other's work

For each assignment

- What did you think of the assignment?
- Which aspects did you find helpful and which less so?
- Did you notice any effects of the assignment?
- Has your perception of the feedback source changed after completing the assignment?
- Can you rank the assignments?

Feedback sources

Questions

- Which feedback sources do you currently use?
- How valuable do you consider these sources?
- To what extent do you actively seek out sources to generate feedback?
- Which additional sources, not provided by teachers, do you use?
- What do you do with these sources? How do you currently generate your own feedback? What do you do with this information (e.g., making notes)?
- How do you use feedback to ultimately improve your work?
- What information about feedback do you feel is still missing? What would you need to use feedback even more effectively?
- Have there been any changes in your use of feedback over the past year?

List of feedback sources

- Published (scientific) texts as examples
- Course learning objectives
- Rubrics / assessment forms or criteria
- Work of fellow students
- Examples
- Written comments from fellow students
- Written comments from the teacher
- Discussions with the teacher
- Discussions with fellow students

- Videos with general instruction
- General feedback from teachers
- Exercises during class sessions
- AI-generated feedback
- Individual feedback from the teacher
- Peer feedback
- General feedback
- Sample articles
- In-class assignments

Closing

- How do you feel your feedback literacy has improved, and what indicates this improvement?
- How would you like feedback to be integrated into education?