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Beyond comments

How to give constructive feedback and the potential of technology

When university teachers are asked about their reasons for using formative feedback methods and how they implement them in their teaching, the responses vary widely. One reason for this variability is the plethora of options and possibilities that digital technology offers for giving feedback. Another is the lack of systematic training on what constitutes good feedback and how to implement it effectively in teaching. As a result, the decision to use particular feedback practices is largely influenced by personal experiences and perceptions of feedback. In this article, we provide an overview of the current understanding of conceptual and structural elements of good feedback that support student learning. We also present different possibilities for feedback practices using digital technology and report on our own experiences with multimedia feedback in higher education. Based on this and literature research, we provide recommendations for the implementation of constructive (multimedia) feedback in higher education.

Elements of formative feedback

The *Cambridge Dictionary* gives a very common definition of feedback, which it describes as "[a piece of] information or statement of opinion about something, such as a new product, that can tell you if it is successful or liked."[1] In an educational context, Hattie and Timperley conceptualize feedback as information provided by an agent (such as a teacher, peer, book, parent, self, or experience) regarding aspects of one's performance or understanding.[2] Since the publication of Hattie's and Timperley's seminal work, many studies have examined different aspects of feedback proposed in their model. However, recent research suggests a paradigm shift: feedback is about far more than providing information about interim or final status or possible implications for improvement. It is also about students' engagement with the feedback and the improvement of individual learning strategies.[3]

In the educational context, two types of feedback are commonly distinguished: formative and summative feedback. Summative feedback is usually provided in the form of a final grade after an assessment has been completed, thus playing an important role in evaluating students' final performance. However, students who receive summative feedback typically do not receive additional information about what was good about their outcome or performance and what could have been improved.[4] Formative feedback, in contrast, is typically given during the course of a work process. By definition, formative feedback plays an important role in an individual's learning and development process. It provides information about the current performance level and an expected standard, along with some guidance on how to close the gap.[5] Henceforth, when talking about "feedback", we are referring to formative feedback.

Feedback can involve different agents in a course: it can be bidirectional, between the lecturer and a student (or all students); it can come from other students (peer feedback); it can come from the students themselves (self-feedback); or can be given between lecturers (e.g., in the case of a collegial teaching observation).[6] In higher education, feedback is usually transmitted unidi-

1 Cambridge Dictionary, n.d.
2 Hattie & Timperley, 2007.
3 Carless & Boud, 2018.
4 Taras, 2005.
5 Ibid.; Ramaprasad, 1983.
6 Hattie, 2010; Wisniewski et al., 2020; Panadero & Lipnevich, 2022.

rectionally from the lecturer to one or multiple students in form of written or verbal comments. Such feedback acknowledges the part of a student's work or learning process that is already good, and identifies areas for further improvement. As lecturers draw on their own experiences and knowledge to provide feedback, it often focuses primarily on the current state of the work, leaving out essential information on how to enhance it or the individual learning process. This often results in students expressing their dissatisfaction with feedback, specifically with comments such as "I do not understand the feedback, it is not helpful at all" or "I received some feedback, but I do not know what to do with it now". As mentioned above, feedback must be constructive and actively support individual development. Thus, constructive feedback is more than merely saying "You did a great job!", giving a grade, or commenting on a written article or oral presentation.

Carless and Boud describe constructive feedback as a process that "denotes the understanding, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies"[7]. According to Hattie and Timperley, any constructive formative feedback must answer the following three questions: 1. Where am I going? (*feed up*) 2. How am I going? (*feed back*), and 3. Where to next? (*feed forward*).[8] The following example contains information responding to each of the three questions:

> Hi Kim, thank you for submitting your scientific report. It was a pleasure to read, and I'm pleased to see that it already meets almost all the required criteria we discussed earlier. [*feed up*] I can see that you have put a lot of effort into describing all the crucial constructs in a similar matter, making it easy to read and understand. This contributes greatly to the quality of your work! I appreciate the structure of the theoretical and methodological sections of your thesis. However, I had difficulty comprehending your results and I could not fully follow your interpretation. [*feed back*] I suggest that you restructure the results to focus on a concise and cohesive argument in the discussion. It might be beneficial for you to refer to the literature and see how other authors structured their result section. [*feed forward*]

As demonstrated earlier, the feed up provides students with detailed information on the goal of the work, i.e., the learning objectives and success criteria. The more specific and transparent the goals and performance criteria,

7 Carless & Boud, 2018.
8 Hattie & Timperley, 2007.

the easier it becomes for students to process and implement feedback effectively. Creating specific rubrics collaboratively can also support this process.[9] Additionally, the feed up phase helps students critically reflect on their own learning. If the feed up works well, the feed-back phase (i.e., receiving detailed information on the outcome or process) can be more independent, as students are aware of the goal and can better assess whether they are on the right track even in the absence of separate feedback from their supervisor.

Thus, the feed-up phase should also prepare students for self-evaluation of their work or process. With the last question, "Where to next?", students should consider the next steps. In this feed-forward phase, it is essential to define the next sub-goals that will help to successfully achieve the final aim. If students are inundated with good ideas and suggestions but left to their own devices, they may become overwhelmed and unable to work with the feedback.

In addition to answering the three questions and considering different actors involved in the process, feedback can address four different levels: the task, the process, self-regulation, or the individuals themselves.[10]

The task level is centred on evaluating how well a task has been completed. Feedback can provide information on incorrect statements and identify any missing components needed to enhance or complete a task.

On the process level, feedback provides guidance on how to approach and solve a task. The objective of process-level feedback is to assess whether the correct procedures were chosen. Unlike task-related feedback, the process level aims to generalize new learning to other future work or learning processes. This can be accomplished by teaching students to identify their own mistakes, enabling them to transfer this knowledge to other, perhaps more difficult tasks. As a result, process level feedback may be more useful for future work than task-level feedback alone.

Feedback on the third level concentrates on self-regulation, which may have the most significant impact on students' future work or learning processes. This level of feedback focuses on six different aspects, which include 1. the ability to provide feedback themselves, 2. the ability to self-assess, 3. the willingness to request feedback themselves in the future, 4. the intention to foster feelings of security and self-confidence regarding the accuracy of one's work, 5. optimizing individual attribution patterns in the event of suc-

9 Ossenberg et al., 2019.
10 Hattie, 2010.

cess or failure through self-regulation-focused feedback, and 6. the readiness to seek assistance when needed.

The fourth and final level of feedback is the personal level. Feedback provided at this level is typically the least effective as it often contains little or no task- or process-relevant information, and instead concentrates heavily on personality traits. Although many students may appreciate hearing phrases such as "You did a good job" or "Your chosen approach is very clever", such feedback often fails to lead to increased commitment, higher self-efficacy, or better understanding of the task and learning objectives. Nevertheless, feedback on the personal level can assist in building a relationship of trust between students and the lecturer.

Conditions for giving constructive feedback

Several models have been proposed to describe various types of feedback, as well as the mechanisms by which feedback can enhance student performance and learning. Panadero and Lipnevich recently conducted a review of these models and concluded that the main feedback elements that impact learning are associated with the message, implementation, student, context and actors involved in the feedback process.[11] Without aiming to elaborate on each of these models, this subchapter concentrates on the conditions that must be considered to ensure that students are receptive to constructive feedback and know how to deal with it. It is worth noting that these aspects are interconnected, and it is nearly impossible to establish a strict order in which they must be addressed.[12]

One of the most important requirements for effective feedback is establishing a positive feedback culture, which involves building a relationship of trust between the giver and receiver of feedback.[13] If the person giving feedback is not well-known to the receiver, the receiver may be less receptive to critical feedback and less likely to take it seriously. Moreover, research has repeatedly shown that feedback is most effective when given at an appropri-

11 Panadero & Lipnevich, 2022.
12 O'Donovan et al., 2021.
13 Boud, 2015; Jug et al., 2019.

ate time, as timing can influence whether students feel they are being taken seriously.[14] Feedback should be provided as soon as possible after receiving a student's work so that they have sufficient time and opportunities to implement what they have learned from the feedback. Providing formative feedback after the student has received a final grade is usually of little use and is likely to be given little to no attention.

Another requirement for effective feedback is that the recipient acknowledges it.[15] It is clear that an appreciative attitude is more likely to be adopted in an environment of trust, as described above. However, it should be emphasized that feedback that goes unnoticed by students is unlikely to have a significant impact on their learning. It is important for students to recognize that they can benefit from feedback and improve their outputs. Similarly, lecturers must acknowledge students' effort[16] to ensure that they feel valued and taken seriously, which in turn makes them more willing to learn how they can improve their work and achieve the objective. In this context, Winstone and Nash discuss the need for student feedback literacy—the skills that students should develop to deal with and accept feedback.[17] This competence includes cognitive, emotional, and motivational strategies for responding to feedback, as well as regulatory strategies.

The adoption of a suitable attitude by the two parties involved is another condition for good feedback, which is to say feedback should be provided in a dialogical atmosphere.[18] It should be noted that feedback need not necessarily be given verbally; what is important is that students are actively engaged in the process and have the opportunity to influence its direction. This inevitably increases the individualization of the process, making recipient involvement more likely. A high level of involvement can also lead to students developing specific expectations towards feedback, which is another criterion of a successful feedback process.[19]

A fourth requirement is the design of the course curriculum and a considered approach to teaching, assessing, and providing feedback. Together with

14 Hamid & Mahmood, 2010; McCord, 2012; O'Donovan et al., 2021; Ossenberg et al., 2019.
15 Boud, 2015; O'Donovan et al., 2021; Ossenberg et al., 2019.
16 O'Donovan et al., 2021.
17 Winstone & Nash, 2016.
18 Boud, 2015; Gigante et al., 2011; Jug et al., 2019; Nicol & Macfarlane-Dick, 2006; O'Donovan et al., 2021; Ossenberg et al., 2019.
19 Gigante et al., 2011; O'Donovan et al., 2021

other didactical elements, such as instructional activities and methods, curricular resources, classroom design and atmosphere, etc., feedback must be consciously planned and designed to address the following questions: What is the purpose of the feedback? When should it be offered? In what formats will it be offered, by whom, and how can it be ensured that students will use it to further their learning? It is important to note that feedback is offered mainly in the context of assessment activities.[20] However, some experts have emphasized the importance of disentangling feedback from assessment. They suggest considering them as two separate cognitive and performative processes, offering them, for example, in the context of peer-feedback practices that are not evaluated.[21]

It is also important to consider the socio-cultural context of every feedback situation.[22] The same feedback can have different effects depending on the cultural background and expectations of the recipient. Therefore, it is beneficial for educators to be aware of their own perspective while considering what constitutes good feedback.[23]

The use of technology in the feedback process

Written and oral feedback remain the primary modes of feedback delivery in higher education, each with its own advantages and disadvantages. However, feedback can also be given through other media or a combination of media, such as audio or video feedback.[24] In the case of written feedback, such as on bachelor's or master's theses, comments are almost exclusively provided in a text format (most of the time in the form of written comments in a Word document). If necessary, students may seek clarification from their supervisors afterwards by visiting them in their office or sending emails. In this format, dialogical exchange between the feedback provider and recipient may only take place after a specific request. A notable advantage of written feedback is that the recipients have a written record that they can refer to multi-

20 Alonso-Tapia & Fernández Heredia, 2008.
21 Winstone & Boud, 2022.
22 McCord, 2012.
23 Ibid.
24 See, for example, Dittler, 2022; and Mahoney et al., 2019.

ple times without having to create separate notes themselves. However, text-based feedback may also lead to misunderstandings. For example, a comment such as "The references are not sufficient at this point" may be interpreted differently by different students, leading to confusion about the feedback giver's exact intention or emotions: Is the feedback giver upset or disappointed that the work was not done properly, or is the comment intended to provide helpful and encouraging guidance?[25]

This type of misunderstanding can be avoided by providing the feedback verbally through direct dialogue. Students can interpret the intention of the feedback more accurately by hearing the lecturer's voice. However, a disadvantage of verbal feedback is the lack of written comments and suggestions for improvement, and the need for the recipient to take their own notes. The feedback cannot be heard more than once in the original wording of the feedback giver. For the lecturer, verbal feedback might be more time-consuming since they must still take written notes as preparation for the meeting, organize the meeting and arrange it as soon as possible to ensure that no significant feedback is forgotten.[26] Interestingly, literature suggests that the content of verbal feedback, regardless of the medium used, tends to focus on more substantive issues than written feedback, which often focuses on grammatical or typing errors.[27]

Comparable to written feedback, audio feedback has advantages and disdisadvantages as well. It is similar to verbal feedback in terms of conveying the verbal and para-verbal aspects of speech, but also offers the advantage for students to listen to the recording repeatedly, independent of place and time. Hearing the lecturer's voice can also enhance their social presence, potentially improving the social relationship between feedback sender and recipient.[28]

In a screencast, which is a recording of the screen displaying the student's work, video feedback can be given with the addition of a "talking head" window showing the person providing the feedback. Such an approach supplements the verbal and para-verbal information of the video with non-verbal aspects of speech. This wealth of information makes it easier for feedback recipients to process the content, especially on an emotional level, as it can help establish a sense of social connection even when there is a local and temporal dis-

25 See also Dittler, 2022.
26 Crook et al., 2012.
27 Moore & Filling, 2012.
28 Borup et al., 2014.

tance.[29] As such, video feedback appears to combine the advantages of both written and verbal feedback.

While multimedia feedback has many advantages for students, what are the economic implications of these feedback media for lecturers? Interestingly, the literature suggests that delivering multimedia feedback takes the same or even less time than writing text-based feedback.[30] Although there may be some initial reluctance and a learning curve when using new technologies, the effort invested in familiarizing oneself with new software or tools seems to pay off for all parties involved after some practice.

Case study: using digital tools in feedback processes

In a research-based learning design course at the undergraduate level in psychology studies at the University of Zurich, two lecturers (1 female, aged 32.5 years old, standard deviation [SD] 1.5 years) evaluated the advantages and disadvantages of multimedia feedback for both students (n = 15, 12 female, aged 21.96 years old, SD = 1.79 years) and themselves. The feedback processes were organized as follows: students received feedback through different media on individual chapters of a scientific report they were required to write over the course of the semester in small groups of three to four people. Specifically, they received traditional written feedback on the introduction, audio feedback on the materials and methods, video feedback via screencast with a talking head on the findings chapter, and feedback on their discussion via an interactive online meeting. The two lecturers were interested in having the following questions answered:

- Which of the received feedback media contributes the most to enhancing the students' scientific writing skills and the feeling of receiving guidance on a subjective level?
- Does the workload for lecturers differ as a function of the feedback medium used?

29 Ibid.

30 Elola & Oskoz, 2016; Henderson & Phillips, 2015; West & Turner, 2016.

To prevent the feedback structure from affecting student responses, the lecturers tried to construct the feedback consistently as suggested by Henderson and Phillips and provided it shortly after the submission of each chapter.[31] Immediately after receiving each type of feedback, students were asked to evaluate the respective feedback medium's advantages and disadvantages using an in-house online questionnaire.

Descriptive statistics[32] indicated the following results: Figure 1A shows that audio feedback had the lowest perceived quality of supervision (M = 4.08, SD = 1.55). In contrast, video feedback was rated slightly higher (M = 5.00, SD = .78), while written feedback (M = 5.39, SD = .65) and interactive feedback (M 5.55, SD = .99) were rated higher still. Comparable results were found for the students' subjective evaluation of their improvement in scientific writing skills as a function of the received feedback medium (Fig. 1B; audio feedback: M 3.62, SD = 1.12; video feedback: M = 4.91, SD = .83; written feedback: M = 5.39, SD = .65; interactive feedback: M = 5.18, SD = .75).

According to additional evaluations provided by students in free-form comment fields, they appreciated the following: in terms of written feedback, students appreciated the clear overview and the ease with which comments could be associated with exact text passages. However, they expressed dislike for the lack of interaction with the lecturer, which left a very impersonal impression and increased the risk of potential misunderstandings.

These disadvantages were partly overcome with audio and video feedback: the use of these two types of media gave students a better feeling of being personally supervised, and there were virtually no misunderstandings. Students also reported that hearing the lecturer's voice helped them to un-

31 Henderson & Phillips, 2015.

32 For the sake of completeness and to get a better impression of the effects in the data, two separate one-way univariate analyses of variance (alpha = .05; n = 9) were calculated for both the feeling of being supervised and the subjective assessment of personal improvement in writing skills (independent variable) as a function of the feedback medium experienced (dependent variable). Post-hoc paired t-tests were calculated for significant main effects. However, due to the small sample size, the statistics should not be given too much weight, so the results are only mentioned in the footnote: main effect of feedback medium on supervision $F_{(3,24)} = 3.700$, $p = 0.050$, $\eta^2_G = 0.208$; audio vs. interactive feedback $t_{(24)} = 3.012$, $p = 0.029$; main effect of feedback medium on writing skill: $F_{(3,24)} = 5.013$, $p = 0.008$, $\eta^2_G = 0.359$; audio vs. written feedback: $t_{(24)} = -3.523$, $p = 0.009$; audio vs. video feedback: $t_{(24)} = -2.768$, $p = 0.049$; audio vs. interactive feedback: $t_{(24)} = -3.020$, $p = 0.028$.

derstand what was most important and what aspects to focus on. They also reported a shift in the content of feedback from a very detailed level in written feedback to a broader, more contextual level in audio and video feedback. For audio feedback, specifying the line number of the passage the lecturer was talking about was very helpful for orientation in the text. It was also reported that these two types of feedback were more time-consuming because it is more difficult to orient oneself in a recorded file than in a text document with comments on specific text passages. Some students also mentioned a limitation in terms of where and how they could consult the feedback, as they were dependent on either a quiet place or headphones. With these two media, students also felt a lack of direct discourse with the lecturer.

The interactive online feedback was designed to address these challenges. In this dialogical feedback format, students appreciated the direct exchange, which allowed for immediate resolution of questions and misunderstandings. Interactive feedback provided a platform for direct discourse, combined with the flexibility of listening to the feedback (although this format requires a quiet place or headphones as well). Some students also mentioned lacking flex-

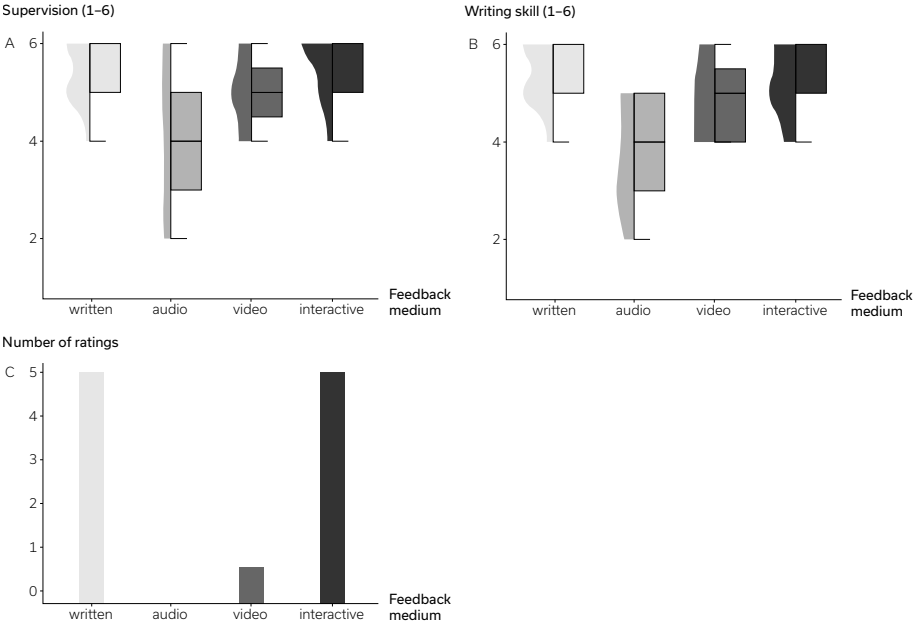

FIG. 1: Students' subjective estimation of A) their feeling of receiving guidance; B) their increase in competence of scientific writing skills as a function of the received feedback medium (6 = very good, 1 = very bad); C) number of ratings of students' preferred feedback medium

ibility in terms of time and the need to take their own notes, as well as the inability to rewind a recorded file, as disadvantages of the medium.

Besides the advantages and disadvantages of the feedback media, all groups unanimously chose both written and interactive feedback as their preferred feedback media, with the same number of ratings (Fig. 1C).

After initially favouring written feedback, mostly because they were accustomed to the method and software, the lecturers found interactive feedback media to be the more advantageous. After familiarizing themselves with the new software, particularly for video feedback, and adapting to giving verbal feedback while being recorded, they deemed more interactive feedback media to be more beneficial to the students' learning process (based on a subjective impression) because of the lower potential of misunderstandings and the ability to ask questions immediately in interactive online feedback sessions. One point worth mentioning is that in interactive feedback, the lecturer must deliberately control the course of conversation to avoid losing the feedback argumentation because of students asking questions and focusing on details. Overall, none of the newly tested multimedia feedback formats required significantly more effort from the lecturers than the already familiar written feedback.

Concluding remarks: the potential and teaching implications of (multimedia) feedback

Although our study was conducted with a small sample of students, the responses suggest a clear direction in terms of which feedback is most accepted: students value both interaction with the teacher and the ability to consume feedback independently of time. Moreover, the amount of personal interaction that students have with their lecturer is related to students' subjective interpretations in terms of the feeling of being supervised and their perceived increase in competence (subjectively rated).

Students reported that, even when recorded (i.e., audio and video feedback), hearing the lecturer's voice creates a sense of personal dialogue,[33] in-

33 Anson et al., 2016; Grigoryan, 2017.

creasing social presence even when the lecturer is not visible.[34] This heightened social presence allows students to better assess the corrections on the emotional level, which in turn reduces misunderstandings and strengthens the relationship between student and lecturer. Additionally, for the lecturers, having social presence and the ability to talk to students while giving feedback was perceived as beneficial. With verbalization, nonverbal and paraverbal cues can help convey the intended message of the suggested corrections. In such a setting, lecturers are also more likely to feel they are in an actual direct dialogue with students, which likewise reinforces the relationship between feedback giver and recipient.[35] By addressing a student by their name, the lecturer can reinforce the impression of individualized feedback, which helps the student feel valued and understood.[36] Although the student's name can also be mentioned in text-based feedback, written feedback is often more abstract and does not offer the same opportunity to engage with students personally that multimedia feedback does.[37] On a personal level, comparing the connection with the students in our study to that with students from previous years, it was observed that staying in contact with them through multimedia feedback, as opposed to text-based feedback alone, led to a much more positive course atmosphere that was much enjoyed. Strengthening this interpersonal level can also lead to increased student engagement and appreciation of the feedback received,[38] which in turn can have a positive impact on the quality of student corrections[39] and increase student engagement in implementing the feedback.[40]

Audio feedback received a lower rating compared to other feedback methods. One might assume that this is due to students struggling to orient themselves within the written text, making audio feedback an unsuitable form of feedback. However, it might also be the case that the rating of this feedback medium was rather influenced by the content of feedback given. As mentioned above, literature indicates that verbal feedback can shift from a concrete to

34 Thomas et al., 2017.
35 Anson et al., 2016; Vincelette & Bostic, 2013.
36 Borup et al., 2015; Harper et al., 2012; Vincelette & Bostic, 2013.
37 Ibid.
38 Boud, 2015; O'Donovan et al., 2021; Ossenberg et al., 2019.
39 Borup et al., 2015; West & Turner, 2016.
40 West & Turner, 2016.

a more substantive level.[41] In our study, the teacher still provided comments on individual aspects of the text by referring to specific lines or paragraphs. However, students still found it difficult to find their place in the text, resulting in the worst evaluation results for audio feedback. Despite this, we believe that audio feedback can generally work well as it conveys the emotions of the person giving feedback, and a direct reference to the product might not always be necessary.

As for the right timing, the students valued timely feedback regardless of the medium used, as it was consistently identified as an important aspect of feedback effectiveness.[42]

An important aspect that should not be forgotten is the amount of time it takes for the feedback giver to prepare the feedback. In our study, there was little difference in the amount of time lecturers took to prepare individual feedback. Several studies report that delivering multimedia feedback takes the same or less time than providing text-based feedback.[43] Other studies even report that preparing and delivering multimedia feedback takes half the time of text-based feedback.[44] One reason for these differences in terms of preparation time may be the familiarity of the feedback giver with the software. Also, technical problems can lead to a devaluation of multimedia feedback measures (compared with written feedback).[45] Therefore, we believe that with a little practice, all multimedia feedback methods can be implemented successfully. However, it is important to remember that if you are going to use audio feedback regularly, it is worth investing in good technical equipment, such as a microphone or software licenses. This can be expensive, but it is likely to be worthwhile in the long run. Some universities provide licenses for their academic staff. However, our findings, in combination with the literature, lead us to recommend that lecturers should first be offered training on how to give good feedback, and secondly, be open and take the time to try new feedback media in their courses.

To summarize, technology expands the boundaries of time and space, providing flexibility in teaching and learning methods that can occur online or

41 Moore & Filling, 2012.

42 Hamid & Mahmood, 2010; McCord, 2012; O'Donovan et al., 2021; Ossenberg et al., 2019.

43 Elola & Oskoz, 2016; Jones, 2011; West & Turner, 2016.

44 Henderson & Phillips, 2015.

45 Borup et al., 2015.

in hybrid formats. It also meets the needs and habits of today's society and students in terms of places to learn, means of communication, and sustainable information delivery formats. Feedback is a powerful force in the classroom, and there are multiple opportunities to increase student engagement using technology—it can make it more effective, more engaging, more timely, more conversational. However, this does not happen automatically. Even with technology-enhanced feedback, the focus should not be on how teachers produce and deliver feedback, but on how learners engage with feedback and how they develop their skills to use feedback.

To provide good feedback, it is important for individuals to consider and answer the following questions for themselves:

- On which aspects should the feedback focus? The product/process, students' self-regulation, or personal aspects?
- What is the aim of the feedback? In other words, what do I want to say and what should I avoid?
- What advice can I give my students on how to effectively work with the feedback?
- How can I enhance the dialogical and personal aspect of the feedback?
- How can I cultivate a positive feedback culture and atmosphere in my course?
- When is an appropriate time to support students' learning process with feedback?
- Does my feedback meet the quality criteria that make it constructive?
- Does the use of technology align with the aim of my feedback/Does the use of technology support students' learning process? If so, what technology is best suited?

Considering that feedback "is one of the most powerful influences on learning"[46], it is our responsibility as teachers to develop formative and constructive feedback processes that focus not only on comments but also on students' uptake of feedback. And since it is essential to invest time in feedback to support students' learning process, why not explore new technologies that can meet their guidance needs in the most effective way?

46 Hattie, 2010, p. 178.

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Figures

FIG. 1: Students' subjective estimation of A) their feeling of receiving guidance; B) their increase in competence of scientific writing skills as a function of the received feedback medium (6 = very good, 1 = very bad); C) number of ratings of students' preferred feedback medium.
Data collected by the authors.