

## **Stimulating feedback conversations: Evaluation of a Textual Feedback Tool for Industrial Design Education.**

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## INTRODUCTION<sup>2</sup>

Rich textual feedback is an important driver of student development in design studies and beyond [1]. In the Educational Programs of Industrial Design (ID) at the Eindhoven University of Technology, feedback plays an important role as a facilitator of learning and a source of information for the assessment of our students' development. Feedback is usually provided verbally during and in written form after all learning activities. Despite the potential power of feedback [2, 3], there are concerns regarding the perceived lack of impact of written feedback on practice [3]. It is argued that written feedback is often unclear and deficient in quality [1]. At ID, the feedback reaches students late or in a form that is not understandable and applicable, but impersonal and unfocused. Furthermore, providing feedback requires a large effort from teachers. In particular when the following is considered:

- The student numbers are growing;
- The staff-student ratio is decreasing;
- The department needs to address the outcomes of the accreditation committee that had serious concerns regarding the consistency and transparency of the feedback and assessments.

Due to the ambitions and challenges the department is faced with, there is a definite need for instruments and tools that assist teachers in capturing and activating the feedback for a much larger number of students, i.e., scaling up high-quality, but resource-intensive feedback methods. A major role necessary for a change is played by technical support systems that should facilitate right feedback practices and should close the loop between teacher and student.

In this paper we describe the introduction of a new textual feedback system in an Industrial Design department at the university level, and evaluate the pilot in terms of quality of support, quality of embodied educational framework, and the overall acceptance of the tool among teachers and students. Through this study, we intend to contribute to the growing body of research on feedback mechanisms and feedback quality assessment in higher education with a specific focus on Industrial Design. Therefore, the following research questions will be answered:

1. How do students value a newly developed feedback tool?
2. How can the feedback tool be improved as a result of this evaluation?

This paper reports on the first results of the implementation and adaption of tool Feedback.camp, explores the possibilities for implementing the tool on a larger scale in the program of ID and presents a scenario for redesigning the tool on to realize implementation on a bigger scale. Consequently, the paper is structured as follows: first, we provide a framework underlying the feedback tool. Then, we describe the tool. Next, we evaluate how the tool was implemented and attained. Finally, we reflect on a potential redesign of the tool and formulate a scenario for the future tool.

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<sup>2</sup> The text of section one and two is partly taken from two studies the authors published already [6, 7]

## 1 THEORETICAL FRAMEWORK

In two previous studies [6, 7] we described the development of a textual feedback tool in detail. We started the development of this tool with a literature review to compile a theoretical framework. For the purpose of this paper, we shortly summarize the framework in this section.

In line with Hattie and Timperley [5], we define feedback as written information provided by an agent with the intention to enhance a learners' performance or understanding. Learning through feedback does not occur to the transmission of the information nor does delivering of the feedback on its' own result in learning [8]. To learn students need to process the information actively and use it. Recently, scholars started to conceptualize feedback as a dialogical and contingent two-way process that involves coordinated teacher-student interaction and active student engagement [8, 9]. Active student engagement is important. The more students actively engage and are involved in feedback processes, the more they are likely to develop the capacity to monitor the quality of their own work during actual learning [10]. This implies that students possess/develop an appreciation of what high quality work is, that they have the evaluative skills to judge the quality of their work (against criteria), and that they develop a store of tactics or moves which can be drawn upon to modify their own work [10]. Eventually, they need to internalize these steps likely to internalize requirements [8]. Students also have an active role to play in making teacher feedback relevant. In that respect, it is important to empower students. Nicole states that in requesting feedback, students engage in reflection even before comments are received [8]. Having students requesting feedback (on their own concerns) potentially enhances the effectivity of written feedback and likely contributes to students' self-directedness.

Hattie and Timperley [5] state that to provide effective feedback answers three questions: 'Where am I going?' 'How am I going?' and 'Where to next?' It provides students with the knowledge about what their learning goals are, how their current understanding or performance relates to these goals and which activities can be undertaken to reach these goals. These questions can be targeted at different levels. These levels are; task, process, regulation, and self. Feedback at the task level is used to verify whether something is correct or wrong or how well something is done. Feedback at the process is feedback focused on information processing and processes needed to understand the task. Feedback at the self-regulation level is focused on how students plan, monitor, direct and regulate their thoughts and actions. Finally, feedback at the self is about personal aspects of learning and positive and negative evaluations of a student. It is important that feedback is focused at the adequate level. To realize this, teachers need to be able to differentiate between different levels both in diagnosing the learning needs of students and in providing written comments.

Many researchers consider the form giving of the feedback important as well [11, 12]. The different form giving aspects of feedback are adequately summarized by Nicole [13] who made ten recommendations for written feedback [13, p. 111]:

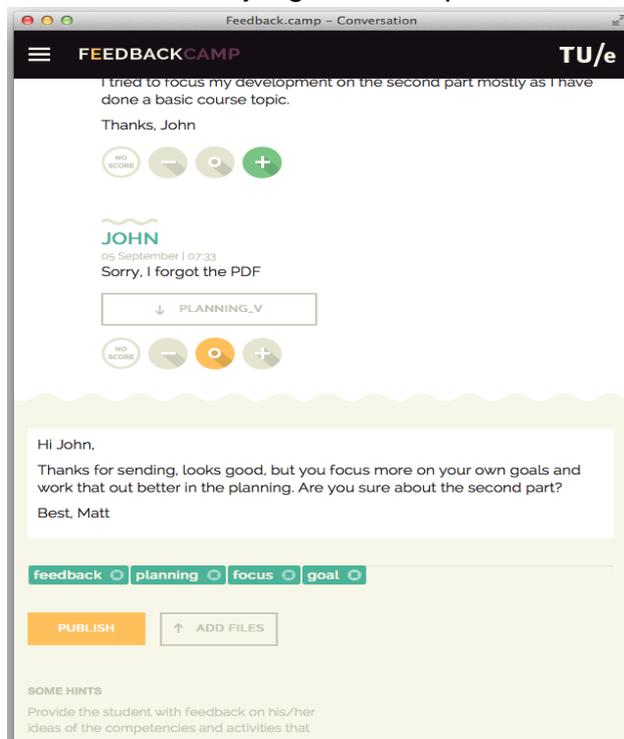
- Understandable: Expressed in language that students will understand.
- Selective: commenting on two or three things that the student can do.

- Specific: pointing to examples in the student's submission where the feedback applies.
- Timely: provided in time to inform the next performance.
- Contextualized: framed with reference to the learning outcomes.
- Non-judgmental: descriptive rather than evaluative, focused on learning goals, not performance goals.
- Balanced: pointing out the positive, as well as areas in need of improvement.
- Forward-looking: Suggesting how students might improve subsequent performance.
- Transferable: focused on processes, skills, and self-regulatory abilities.

To summarize, in the framework for the textual feedback tool it is found important to empower students, to stimulate feedback dialogues, to direct and focus feedback and to design the form giving of comments well.

## 2 THE FEEDBACK TOOL

In this chapter the feedback tool will be described [6, 7]. The goals of the feedback tool are to facilitate fast feedback loops in written teacher feedback, enabling: feedback as open and personal conversations, giving focus and direction to students, allowing for feedback pull, so that the student is in charge of getting feedback as a useful 'feature' of learning, allowing for quality assessment of written feedback and generating richer feedback process data, how the tool is used and how it improves feedback. The feedback tool is based on a matrix outlining on which moments during students' learning activities, feedback can be provided, which questions need to be answered for providing feedback, and which quality criteria the feedback needs to adhere to. All this should facilitate fast cycles in written teacher feedback that will give written feedback its constructive and informative purpose, and will let assessment and judgmental aspects reside in the background.



*Feedback as conversations.* The feedback tool strives at keeping the advantages of face-to-face feedback conversations and, at the same time, to bring the quality of documentation and book keeping, which allows for feedback to be re-read and reflected upon. In the tool, feedback conversations are displayed as messages between student and teacher or coach; similar to popular messenger tools (see Figure 1). The individual feedback entries can be enriched with file attachments, and they can generally be characterized as (1) requests for feedback, (2) feedbacks, (3) clarifications, and (4) follow-up. This visual representation of written feedbacks as conversations takes away the definite character and increases communication between both parties.

Figure 1: Feedback conversations help lower thresholds

*Giving focus and direction to feedback.* The feedback tool does not allow for “wholesale” feedback about an entire learning activity. Instead, every learning activity has specific “feedback aspects” (see Figure 2), for which a feedback conversation can be started. These aspects are different for different types of learning activities, and they are shown throughout the feedback conversation user interface (e.g. projects and assignments). When authoring feedback conversation entries, let it be the original request from students, or feedback, or elaboration, both students and teachers are given hints what to think about when writing feedback, readily shown next to the authoring area. These hints directly relate to the feedback aspects and will give different suggestions. This way, we hope to reduce the occurrence of “writer’s block” and forgetting of essential aspects. As another help for busy teachers, related feedback conversations are linked in the authoring view so that inspiration can be easier found, but also recurring questions can be answered more efficiently. Finally, breaking up the feedback for an entire learning activity into smaller chunks, allows for better understanding how the student could balance her activities better, and the interface explicitly shows focus areas with a lot of feedback and, contrasting, blind spots, where feedback is still lacking. The final user interface of the feedback tool simplifies the “management” of many ongoing conversations of a student with different teachers, or of a teacher with many students, by indicating waiting, unread entries and draft entries that need to be submitted to the student.

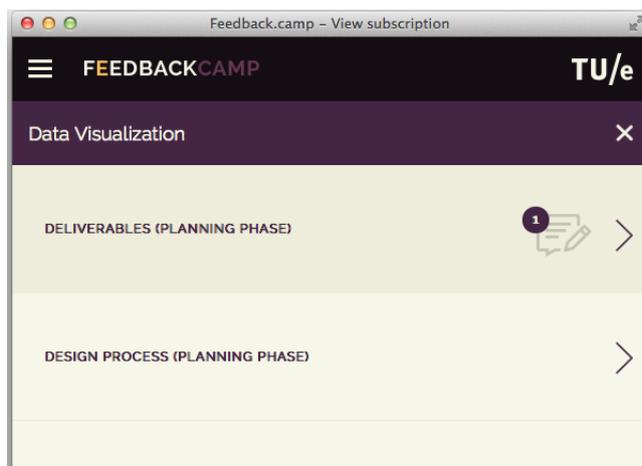


Figure 2: Concrete feedback aspects for focus and accuracy

*Allowing for feedback “pull”.* An essential point of the feedback tool is to allow for ad-hoc feedback and to empower the student by putting the student in charge of getting feedback, essentially “pulling” it from the teacher instead of waiting for feedback that in busy times often comes too late to help. Timely feedback indeed is key to learning [11]. The feedback tool supports notifications (by email), but also encourages its users to keep the written feedback conversation entries rather short and concise.

*Allowing for quality assessment.* How quality can be perceived can be quite personal and context-specific. The feedback tool allows for indicating how helpful and relevant the feedback is. This way, both teachers, and students can adjust the content and presentation, for instance, by shortening descriptions in feedback requests (students), attaching contextual material (also students), or by choosing simpler wording in the written feedback (teachers). As a direct means to improve the accuracy and also the general relevance of the feedback, several hints were included in the user interface of the feedback tool. These hints are context-sensitive and

depending on different aspects of a feedback for a learning activity as well as the timing of the feedback within the learning activity: in the planning phase, different hints will be shown than when the activity is in progress. This should trigger both teachers and students to focus on the information needs at the moment, and not to fall back into old patterns of too generic and vague feedback.

### **3 IMPLEMENTING THE FEEDBACK TOOL AND USERS' ADOPTION**

#### **3.1 Method**

The tool Feedback.Camp was implemented in 2014-2015 during a module taught by the second researcher as part of the Bachelor Program of Industrial design (N=9). The students were asked to complete a short structured questionnaire after the final meeting of the module. In this questionnaire, students were instructed to respond to questions that provided us with insight in how students experienced using the tool Feedback.camp. In the questionnaire, students were asked to respond to statements in the form of items. Two examples of items are:

1. I am satisfied with the frequency of feedback.
2. I am in charge of getting feedback.
3. The feedback I received during this learning activity in which we used the feedback tool was expressed in language that I understand.

The items could be scored on a five-point scale ranging from (1) I totally disagree to (5) I totally agree.

To determine how students experienced using the tool Feedback.camp we used frequency scores. Finally, five students completed the questionnaire. Next to the questionnaires, the teacher kept a log-book to record his own observations and reflections. Finally, we organized a focus group meeting with participants to collect more rich and in-depth information on how the tool was implemented and adopted. For various reasons, only three participants were able to join the meeting. During the focus-group meeting, an observer made notes. The notes were analysed using different themes. The questions asked during the meeting guided the choice of theme (e.g. dialogical feedback and usability of the tool).

In the following section, we describe how students experienced the use of the feedback tool. To describe this, we will integrate data from the questionnaire, focus-group meeting, and the teachers' log. We will describe results for the following themes: empowerment, dialogical feedback, quality of feedback, focussing of feedback, usability, and others.

Per theme, striking findings are mentioned, and illustrative fragments as noted during the focus group meeting are provided.

#### **3.2 Results**

*'Empowerment of students.'* All students perceived the feedback tool as stimulating and empowering. The students said the following about the stimulating and empowering effects of the tool: Tijn: "I was stimulated to keep asking feedback, even if there was some time where I was busy with my project. It seems like a small reminder." Researcher one: "A small reminder, like a trigger?" Tijn responded: "I was motivated to keep checking and asking." Pepijn said: "Personal feedback makes it attractive. Intermediate feedback stimulates a more active attitude." Researcher one: "Does that mean that you were empowered already?" Martijn: Yes, I've always felt empowered. [The other students confirmed this]. This means that the tool facilitated

students to pose questions, ask for feedback and supports students to self-direct their own learning.

*'Dialogical feedback.'* The students considered the tool as a conversation tool. The students appreciated that the all the previous comments and remarks of teachers and students were stored and that comments, questions and asking for feedback could be built on previous remarks. The following remarks demonstrate that students appreciate the integration conversation history: Martijn: "It is a conversation that you can read back and build upon. Sometimes when I started working on something, I would read back." Tijn: I often scrolled back to the building blocks to look for input and reminders. Pepijn: "Same". Thus, the students experienced the feedback tool as a tool that enables conversations.

*'Quality of feedback.'* All the students (highly) agreed that the feedback was understandable, selective, descriptive, balanced and provided suggestions for improvement. In that respect, students experienced the feedback as very useful. Students were less positive about the specificity of the feedback. This means that written comments should include more statements that point to examples in the student's submission where the feedback applies. Also, the timing of feedback was negatively valued. In the focus group meeting, students suggested providing an indication of when the feedback is to be expected. In general, good timing of written feedback was seen as a major point for improvement. The following fragment from the meeting illustrates this: "I did not know when to expect an answer. Sometimes it took too long, and it was frustrating. It was not like a chat conversation, but like an e-mail conversation." Another student remarked: "I felt like I could ask for feedback more than start a discussion." Thus, in general, the students experienced the feedback as provided via the tool as useful. The timing of the feedback was considered as a major point for improvement.

*'Focusing of feedback.'* The tool enables students and teachers to provide feedback on different aspects of learning (see: figure 2). In this way, the feedback can be more focused. The students all perceived the feedback to be more directed and focused. The focus group meeting provided more insight in how students deal with the different topics to ask feedback for or to provide feedback on. The following conversation illustrates the deeper insight in focusing of feedback.

Researcher two: "The feedback was much focused. Did you use the different categories?"

Tijn: "I actually started the discussion in the 'deliverables' block before I noticed that there was a 'progress' block, but it felt weird to restart the conversation." Researcher two: "So that is a briefing thing?" Pepijn: "Hmm, I do not know. I think it is weird that you would have two conversations about the same subject. Process and deliverable are intertwined, no need to split." Tijn: "I think the split is good, but the deliverables block should not invite too much conversation. That is what process is for. I use the input from the deliverables in my process, so that is where the discussion should happen." The text fragment illustrates that not all the students automatically understand and use the different categories as intended.

*'Usability.'* All students indicated that they liked the usability of the tool. According to the students, no changes need to be made to enhance the usability. For example, Tijn remarked: "Not for me, I did not experience any troubles." Furthermore, all students read the hints about asking feedback. Only, not all students used the hints,

and if the hints were used, the students used these hints in different manners. The following text fragment illustrates this. Tijn: "I read the hints but didn't use them". Martijn: "For me, the hints explained what the sections were about." Pepijn: I did use the hints. The hints helped me to form the text I would deliver.

#### *'Others.'*

The students were of the opinion that the tool had substantially realized its goals. Amongst others, the students mentioned the following gains:

- "Due to more personal feedback, planning and reaching your own set goal was more effective to reach."
- "It allowed for the assignment itself to be more efficient since explanation time was saved. I think that for the tool to be very useful, feedback should be given (the tool should be checked) at regular intervals."
- I think it realized most of its goals (almost all). The conversation led to more focussed, frequent and qualitative feedback, which was used as more input for my design process. Compared to the original feedback system, it was more transparent, and it stimulated me to take control of looking critically at my own work instead of the assigner doing this for you.

The teachers wrote in his log that students needed to be reminded of focusing on the specific aspects of feedback for the learning activity. For example, they often sent deliverables in for feedback, but omitted planning for future deliverables, motivations and reflections about deliverables. The teacher also noted a low-invitee-participant ratio. The teacher wrote in his reflections in the logbook that the students participating in the pilot were not fully aware of the role of the feedback tool in the feedback process of the learning activity. Also, he wrote that the students were not aware of the possibility to receive faster and more focused feedback during the learning activity, instead of only at the end.

### **3.3 Conclusions**

The pilot provided us with important insights despite the fact that the number of participants was small and data therefore needs to be interpreted carefully. It is demonstrated that the students value the newly developed feedback tool. Students were (very) satisfied with the quality of the feedback and also with the usability of the tool itself. It seems that the tool realizes its goals of empowering students and creating dialogical feedback. Thus, we can carefully conclude that the feasibilities included to empower students and to create dialogues are functional and work well.

The pilot also indicated some aspects that need close attention in the future redesign of the tool and/or implementation of the (re)designed tool. First, it appeared that students not automatically direct and focus their feedback. In other words, students need to learn to use the different categories (see figure 2) of the tool. We already developed an annotated slide set that will guide students through the first steps of using the feedback tool. More, in general, it seems that more attention needs to be paid to make students aware of the role of the feedback tool, its underlying framework and the specific features and functionalities of the tool. Developing training might be a logical follow-up. Such training can also be designed for teachers who start using the tool.

Second, it turned out that the timing of feedback, in terms of delivering feedback on time, was an important point for improvement. Students provided some useful

suggestions here. For example: working with fixed intervals to provide feedback or enhancing expectation management about the response time. Although useful, it can be questioned whether these suggestions will be sufficient for providing feedback in time and providing feedback on a larger scale. The delay of feedback could be attributed to an overall high workload. Potentially, this will prevent teachers from participating in next pilots as they might be afraid of the extra load that an additional support tool can cause. In that respect, it is of utmost importance to further integrate and embed the tool in our educational support processes and curriculum. An important incentive for implementing the tool on a bigger scale would be to assure that the tool addresses the concerns raised by the accreditation committee: inconsistency and intransparency of the feedback and assessments.

#### **4 EXTENDING THE FEEDBACK TOOL: A FUTURE SCENARIO**

A logical follow up of the evaluated tool and needs of the ID department initiative would be to investigate how such tried and proven improvements can now be integrated into the education program of Industrial Design at a larger scale, with special attention to a high degree of automation, structural conformance, good integration with educational processes, and finally strong incentives for teachers to join and leverage novel feedback tools as a key time saver. We believe to enhance the opportunities of the program by targeting the following:

1. Extending the existing feedback tool with formative and summative assessment tools according to current reworking of education practices;
2. Developing tools that make the feedback and assessment more efficient and consistent (e.g. rubrics);
3. Developing tools for providing feedback and assessing practical exercises;
4. Including and improving personal development planning (PDP) functionalities into the system;
5. Using PDP functionalities in the system to make the feedback and assessment more personalized.

We intend to redesign the current Feedback.camp tool to a system that facilitates and stimulates students to ask for feedback, that registers, monitors and facilitates the use of feedback for students' learning and does justice to the dialogical and interactive feedback of students. Additionally, it would be useful when the system offers possibilities for several ways or methods of assessments, e.g., story-lines (for development) and rubrics for self, peer, and teacher-assessment. Also, it is important that the feedback can easily be used as evidence for the development of students. Ideally, the system would be built around the Personal Development Plan. Such a system would assist our coaches in guiding our students in realizing their goals, needs to monitor or map the development of the student, needs to enable assessment of development and make the development visible and finally, support and challenge to direct their own learning. Making connections in the system between personal goals and providing feedback makes it possible to make the feedback personal. This enhances the experience of small-scale education within a growing student population.

Finally, to realize such a scenario it is important that we also recognize and realize the right conditions for implementing Feedback.camp for teachers [14]. First, it is important to give teachers a voice in the redesign of the tool and to realize feelings of ownership. Next, it is crucial to assure that teachers possess sufficient knowledge and skills to use the tool. Furthermore, using the tool should be adequately facilitated. Finally, cooperation between teachers and exchange of ideas and experiences with using the tool should be organized.

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