feedback.camp innovation series part 1

FORMATIVE ASSESSMENT

Enriching teaching and learning with formative assessment.

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with formative assessment

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1. INTRODUCTION

Formative assessment is a valuable aspect in teaching and learning, and is proven to be an effective learning method. There is evidence that adding formative assessment to your teaching increases students' learning results (Black and William, 1998), but in practice many of the possibilities are left unused (Sluijsmans, Joosten-Ten Brinke, & Van der Vleuten, 2013).

For this reason we made a second iteration of Feedback.Camp, which is a tool developed by researchers in the Department of Industrial Design (TU/e) to support (a) teachers in providing timely, targeted and dialogical feedback, and (b) students to engage with the teachers in low-threshold, focused feedback conversations. In the latest version we included elements of formative assessment: rubrics. This booklet was written to accompany the tool, as background information on formative assessment.

We will outline a vision on what formative assessment entails for contemporary Industrial Design education and beyond, and how formative assessment can be embedded in practice. In writing this booklet, we presume that the reader has some background knowledge and experience in designing and teaching courses. What we aim for is to give you insight into different forms of formative assessment and strategies. On the one hand, this will most likely help you to realize that you already apply elements of formative assessment in your practice. On the other hand, this might support you in systematically, structurally and intentionally embedding formative assessment in your practice in such a way that student learning is enhanced. We hope to inspire you to try things out in practice, and thus further enrich your teaching and learning with the use of formative assessment.

We are very interested to hear back from you about your experiences with formative assessment, and invite you to send us your feedback and comments. Also, if you are interested in experimenting with our tool Feedback.Camp, you are very welcome to. Please contact us, and we can make it available to you.

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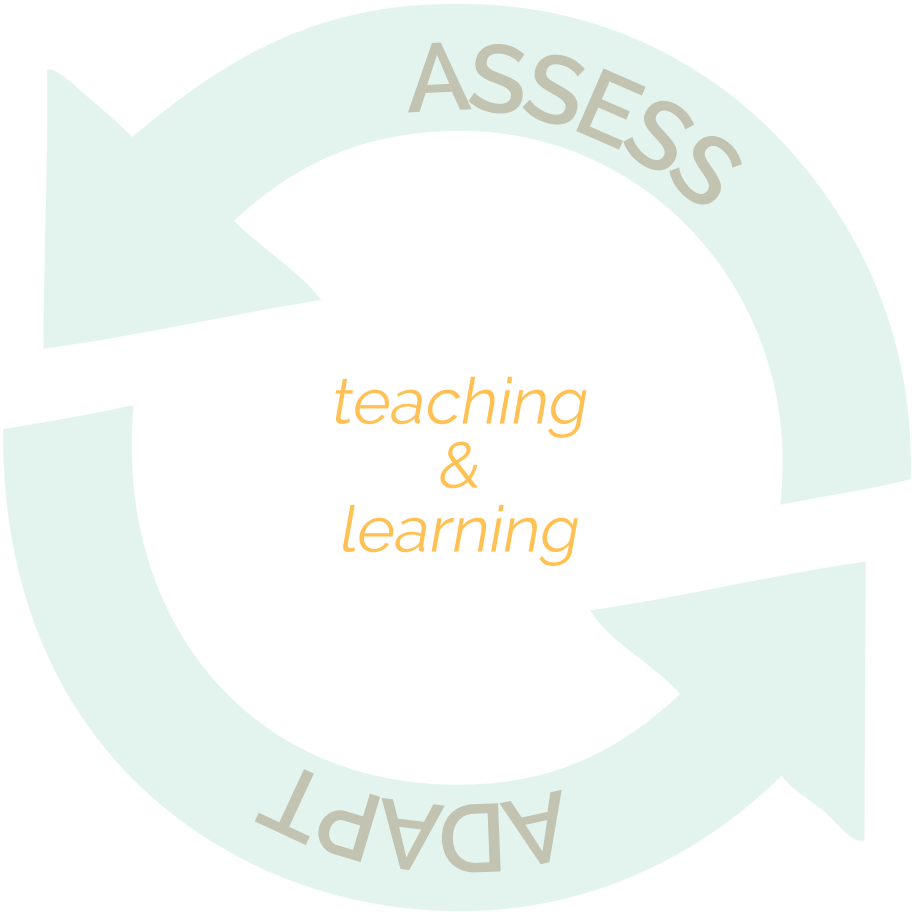
2. WHAT IS FORMATIVE ASSESSMENT AND WHY IS IT EFFECTIVE?

If you dive into the literature and research about formative assessment, you will find that many different definitions exist (Andrade & Cizek, 2010). And, that some definitions focus more on particular aspects, e.g. on 'instruments' versus 'processes', or 'teacher-centered' versus 'student-centered approaches', or 'pre-designed learning activities' versus 'on-the-fly interventions' (Sluijsmans et al., 2013). This leads to many different forms of formative assessment in practice, in some of which the teacher is the only actor, and in others the students are also actors.

There is also a large overlap between the definitions, which we consider to be the essence of formative assessment. Inspired by William (2011) we believe the big idea of formative assessment is:

"To collect and interpret evidence about the current level of student learning, and to use this information to adapt teaching and learning to the students' needs and thus to enhance further learning. The aim is always for students to close the gap between where they currently stand, and the intended learning outcomes."

An example of a commonly used teacher-centered method of formative assessment is to ask students questions during a lecture to check whether they are still on track. And if they are not, to adapt the lecture, e.g. by explaining the theory in a different way or by giving an example. An example of a more student-centered method is to ask the students to use rubrics to perform a self-assessment, and based on this to make a personal development plan for reaching the learning objectives.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As mentioned in the introduction, there is evidence that using formative assessment increases students learning results. But why is this? To explain this, let's take a look at the following three key processes of teaching and learning to see how formative assessment fits into them. In any learning situation it is essential for students to find out (Ramaprasad, 1983; Black and William, 1998; Hattie and Timperley, 2007):

1. Where they are now in their learning (current situation)
2. Where they are going (learning objectives/intentions)
3. How to get there (learning path)

The teacher usually has the leading role in this, but also the learners themselves and their peers play important roles. Ideally education is designed in such a way that as students progress through their studies, they and their peers are given more responsibility in taking on part of this role (Vermunt & Verloop, 1999). There is evidence that when students can and do take on more responsibility for their learning, this leads to increased learning results. And, as an added bonus it can lead to reduced time investment for the teacher, because students and peers learn to take on part of a role previously performed only by the teacher.

The reason that formative assessment is so effective, is because it supports these three key processes of teaching and learning. Evidence obtained by formative assessment about the current level of student learning gives insight to both the teacher and the students on where the students currently stand in their learning, and how they need to proceed to achieve the learning objectives. And, because of this gained insight, students can take on more responsibility for their own learning which enhances the motivation of students and makes learning more student-centered. In other words, formative assessment is particularly useful in fostering students' self-directed and self-regulated learning.

table 1: *relationship between key processes of learning and strategies of formative assesment*

3. STRATEGIES OF FORMATIVE ASSESSMENT

In this booklet we provide you with a framework of how several strategies of formative assessment fit into the key processes of teaching and learning, so that you can make a choice of which methods best match your educational setting. We make use of the following five strategies of formative assessment described by Leahy, Lyon, Thompson & William (2005):

1. Clarifying, sharing and understanding learning intentions and criteria for success.
2. Engineering effective discussion, activities, and learning tasks that elicit evidence of learning.
3. Providing feedback that moves learning forward
4. Activating learners as instructional resources for one another
5. Activating learners as the owners of their own learning

In table 1 you can find an overview of how these strategies are related to the three key processes of learning and to the three actors (teacher, peer and learner). In the following sections we describe the strategies, and explain how you can use them to increase learning results and to help students take more responsibility for their own learning. We will use examples that are more teacher-centered, and some that are more student-centered. Also we give examples for both small-scale and large-scale learning situations.

	Where the learner is going	Where the learner is right now	How to get there
Teacher	clarifying and sharing learning intentions & criteria for success	eliciting evidence of learning	providing feedback that moves learning forward
Peer	understanding & sharing learning intentions & criteria for success	activating learners as instructional resources for one another (students become instructional resource for their peers)	
Learner	understanding & creating learning intentions & criteria	activating learners as the owners of their own learning (students take on role as owners of their own learning)	

STRATEGY 1

Clarifying, sharing, understanding and creating learning intentions and success criteria.

The focus of the first strategy of formative assessment is on clarifying, sharing and understanding learning intentions and success criteria. As mentioned above, one of the key processes of learning is to support students in understanding where they are going. Without this knowledge, students could put a lot of effort in working on something they think is relevant, but might not be helping them achieve their learning objectives for the course.

So, they need to understand what you, the teacher, intend for them to learn, and learn to recognize whether they are on track in achieving this. It is therefore essential that you share and clarify your learning intentions and criteria for success. A requirement for this is that you have formulated clear learning objectives (see the box on 'The importance of clear learning objectives').

The importance of clear learning objectives

Often teachers don't fully see just how important it is to formulate clear learning objectives to support student learning. But with the aid of clear learning objectives you allow for the following:

- to get students to focus on the what is important within your course and to direct students learning processes.
- to clarify what you expect from the students ('where the learner is going'):
- to allow you to evaluate students' learning: As a teacher you need to knowhow far the students have come in their learning in relation to the learning objectives ('where is the learner right now') to be able to give students qualitative feedback and thus help them on in their development ('how to get there')
- to help students develop a concept of quality, and thus be able to monitor their progress: Students need to understand what it means to achieve the learning objectives, for them to realize how far they currently are in achieving them, and to be able to decide which step to take next in their learning process.

There are many ways in which you can help students understand what the learning intentions and success criteria are. Obviously a good start is to make the learning objectives and assessment criteria available to students for example in a study guide. But in addition to this we advise you to design learning activities to help students really understand where you are trying to go with them during your course, and to collect evidence about their current understanding of this.

A teacher-centered method could be to show examples of last year's student work, and to point out the strengths and weaknesses in each. This method is quick and easy to implement. You could also choose to use a more student-centered method and make things more activating by leading a discussion in which you ask students to give arguments about what they consider to be the strengths and weaknesses. In order for students to be able to do this, they need to think about how the learning objectives and assessment criteria are related to the examples. They might not realize this at the start of the exercise, but you can point them in the right direction and give the students a moment to (re-)look at the learning objectives and/or assessment criteria for your course.

Both methods just described will give students some insight into what is expected from them and what are criteria for success, but because the students are more actively engaged during the second method, they are likely to gain more insight into the learning intentions. And, another advantage of the second method is that by collecting the students' reactions you can check whether they are indeed gaining this insight. We will discuss this aspect further in strategy 2 'Eliciting evidence of learner's achievements'.

In both of the above examples, it is the teacher who defines the learning objectives. But in a more student-centered educational model, it might be the student who is expected to formulate (part of) their own learning objectives. In that case the student has the leading role in this strategy, and the teacher has a monitoring role.

There are many more methods you could use to help students understand the learning intentions and success criteria, e.g. by giving examples of exam questions or asking students to try to formulate them, having students perform self- or peer-assessment making use of a rubric, etc. We will discuss self- and peer-assessment in later sections of this booklet.

STRATEGY 2

Eliciting evidence of learner's achievement.

In the first strategy we focused on giving students insight about ''where the learner is going'. In this second strategy the focus is on finding evidence about 'where the learner is right now'. Often, teachers presume that learning is taking place, and forget to check whether, and to what extent this is the case (Van de Pol, 2012; Van Diggelen, 2013). The fact that you have explained a subject, or have asked students to read a chapter of a book or make an exercise, does not necessarily mean that they have learned all that you intended them to. Also, they might have developed some misconceptions about parts of the theory, or about the assignment to be made. It is important to explore students' thinking or view examples of their work to either confirm that they are on track, or to see which misconceptions or gaps in learning still exist. The reason to do this is so you can adapt your teaching to the students needs, if that appears to be necessary. It is also important that students learn to check for themselves whether they are still on track, and if necessary adapt their learning path.

Let's look back at the example we gave above, about discussing examples of student work to help clarify the learning intentions. By discussing this issue with the students you will receive valuable feedback how to proceed with your course. For example, if the students are having quite some trouble in relating the objectives to the examples, you might discover that students have misinterpreted your objectives for this course, or don't have the prerequisite knowledge you expected them to have. Also by doing the exercise, the students will gain some insight whether they correctly interpreted the link between the learning objectives and the intended deliverables.

A common method of formative assessment you can use to collect information about the level of student learning is the interim assessment (see the box on 'Interim assessment').

Interim assessment

An interim assessment has many possible forms, e.g. it could be a multiple choice test, the handing in of homework assignments such as a report or another deliverable, or a presentation with an update about ongoing project work. The choice of which form to choose for the interim assessment depends for a large part on the learning objectives that will be assessed. And, every form has its own characteristics that make it more or less suitable for the specific learning situation, concerning e.g. time-investment, resources required, and level of student self-directedness needed for it to work.

The aspects that all interim assessments have in common are that during the run of the course students current achievement level for (some of) the end-of-course learning objectives is assessed, and students receive feedback on where they stand now and which gaps in learning still need to be breached.

By using interim assessments a course is divided into smaller chunks, which can help students to focus their learning. Also it can help in preventing delays, by supporting students in getting started with their coursework.

Other methods you could use to elicit evidence of learner's achievement are e.g.: class discussions to check students' understanding of core concepts, use of clickers/raising hands, the one-minute-paper, and self- and peer assessment.

STRATEGY 3

Providing feedback that moves learning forward.

In the first strategy we described, the focus was on 'where is the learner going'; in the second strategy the focus was on 'where the learner is right now'. In this third strategy 'providing feedback that moves learning forward' the focus is on 'how to get there', or in other words: bridging the gap between the student's current situation and the intended learning outcomes.

Qualitative feedback is a powerful tool in achieving this. In fact, when used well, feedback has been proven to be one of the most effective elements in increasing student achievement (Hattie and Timperley, 2007; Shute, 2007). But, providing effective feedback is more difficult than it appears, and well-meant feedback can actually turn out to be counterproductive when important feedback aspects are not addressed.

In general, advice on giving qualitative feedback is based on two principles:

1. Give the student feedback based on the three key processes of learning:
   - Remind the student of the related learning objectives ('where is the learner going').
   - Give insight into how far the student has come in reaching them ('where the learner is right now') .
   - Give information (or help the student to discover) what are the next steps to take. ('how to get there').
2. Give feedback on different levels of student learning. We use the following division of 'task', 'process', 'self-regulation' and 'self' (Hattie and Timperley, 2007). The direction that student learning will take is influenced by the aspect you decide to give feedback on:
   - **Task:** Feedback about how well the task is being accomplished or performed, f.e. about right/wrong calculations. (can lead to better performance on the specific task)
   - **Process:** Feedback specific to the processes underlying the tasks, providing deeper understanding, f.e. on 'how to apply' or 'how to analyze' (can lead to better performance on similar tasks)
   - **Self-regulation:** Feedback about how students monitor, direct and regulate their actions in working towards the learning objectives. (can lead to better performance on self-regulated learning, and thus to better learning results overall)
   - **Self:** Feedback directed at personal aspects of the students without specifying observed behaviour, f.e. telling a student that he is talented in maths. (might lead a student to develop further in the direction of his strength, because it's nice to be praised, but can also lead to insecurity, because the student doesn't know what in his behaviour caused this).

As you can see, there are many aspects you can give feedback on. But be careful that you don't overload a student with feedback. It is usually better to focus on just a few points. And, you might find it a challenge to give students feedback on the level that is appropriate to their learning. Regarding the targeting of levels, in general, the advice is to start by giving feedback on 'task'-level and to progress towards 'process'-level, and then on to the level of 'self-regulation' (Hattie and Timperley, 2007). Also, try to be sparing in giving feedback on the 'self'-level, such as praise and disapproval. What you are aiming for in giving feedback is that you get the student to do something with it. In the first place that you get the students thinking about the feedback they received, and in the second place that they put this feedback into a plan and action. It would be good to check that and how students process the feedback they received. You could do this, e.g., by asking them questions, or by asking them to make a plan for further development based on the received feedback.

STRATEGY 4

Activating peers as instructional resources for one another.

In this fourth strategy of formative assessment the focus is more on the role that peers can play when it comes to student learning. Peers can function as instructional resources for one another. A bonus to using this strategy is that it can increase teacher time-efficiency, but that should not and need not be the main reason for using this strategy.

One form of formative assessment you could use here is for peers to team up in pairs or small groups and to discuss questions about the theory and to explain to each other aspects that are not yet clear. One advantage of this is that students will discuss and explain issues in other words than you do. This gives the listening students a chance to understand the theory by having it explained slightly differently. A second advantage is that it can be easier for students to ask questions for clarification to a fellow student, rather than asking the teacher. Therefore, students are likely to learn more about the aspects they don't yet quite get. And a third, and perhaps the biggest, advantage is that having to explain a subject in their own words increases the peer's own knowledge and understanding of the subject. So, the peers are not only helping the other students by explaining the new material, they themselves are perhaps the ones learning most during the process.

A different form of formative assessment that you could use within this strategy is peer-feedback or peer-assessment. Students are asked to review other students' work (this could be a report, an exercise, a presentation or even the taking on of a role within team work), and formulate their feedback for the other students to learn from. Students can only do this if they understand what the learning objectives and success criteria are and can recognize this in the other students' work. In that way they internalize these objectives and success criteria, and can make use of this knowledge for their own work. You can help students with this, e.g., by providing a rubric. Also, students need to be able to formulate effective feedback. As you can imagine, students will need guidance in this, and their feedback may not be effective during their first try. But if this method is used throughout the curriculum, the students will gain experience and skills over the years. It is a worthwhile investment for all involved, because if students get used to assessing other students' work on how it compares to the intended learning outcomes, it will make it easier and more natural for students to also assess their own work. Assessing the work of others is emotionally less charged, peer-assessment provides a useful stepping stone for self-assessment and thus for enhanced self-regulation and self-direction.

STRATEGY 5

Activating students as the owners of their own learning

This last strategy focusses on the students themselves as owners of their learning. If you manage to help students take ownership for their own learning and development, or in other words to become self-regulated learners, you are thereby helping them to become more effective learners (Zimmerman & Schunk, 2001). Self-regulated learning can be considered as a process whereby a student sets goals for learning and then attempts to monitor, regulate, and control their cognition, motivation and behavior to achieve the goals (Pintrich, 2000). In order for them to be able to do this, they need to feel like they own the objectives of learning and be active in directing their learning. As a result self-regulated learners learn more and have greater academic achievement.

One of the reasons why self-regulated learners are more effective learners is because the students themselves have constant and instant access to valuable feedback concerning their own thoughts, actions and work. If students have learnt to regulate their own learning, they can effectively make use of this internal feedback to develop their learning.

Self-assessment is a form of formative assessment that you can use to help students increase their self-regulated learning. Self-assessment is a process in which students apply criteria and standards (either composed by the teacher or by the students themselves) to their own work to judge its quality (Boud, 2013). Both self-assessment and self-regulation implies student involvement in thinking about or judging the quality of work. Also, they are not depended on the teacher for the evaluative judgement. Self-assessment is focused on judging the particular quality of a performance whereas self-evaluation is mostly used for activities related to grading one's own work. To enable effective self-assessment, it is important to create a learning situation that includes the following conditions (Goodrich, 1996):

- Students are aware of the value of self-assessment
- Students have access to clear criteria (e.g. by means of a rubric or checklist)
- there is a specific task for assessment
- models or examples of self-assessment are provided
- direct instruction and feedback are provided
- opportunities for revision are present.

4. EPILOGUE

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