Deep Learning through Peer Feedback in Higher Education;

a Manual for Teachers

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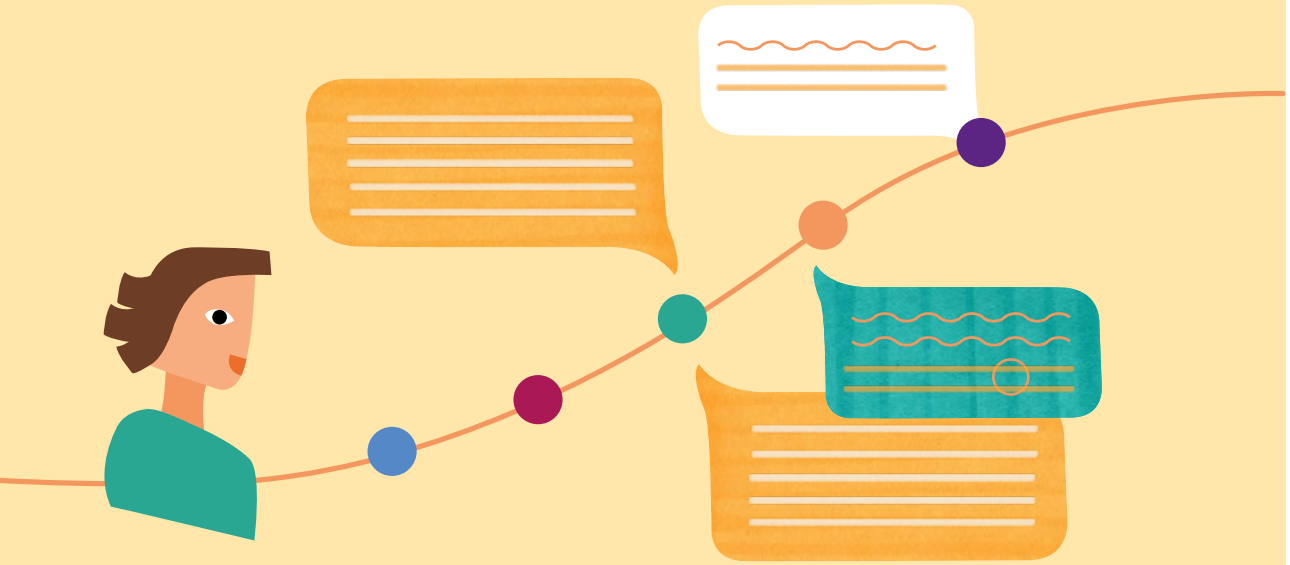

1 Introduction and Outline

One of the core tasks of universities is to enable deep learning in their students. Deep learning involves critical thinking, making new connections between different concepts and integrating what has been learned into what the student already knows (Biggs, 1999). Deep learning is often contrasted with "surface learning", the latter being characterized by memorization mainly aimed at passing a test and resulting in rather quickly forgetting what has been learned. Only when students are encouraged to adopt deep approaches to learning, high quality learning outcomes, such as analytical, conceptual & critical thinking skills can be achieved (Biggs, 1999; Ramsden 2003; Biggs & Tang 2011).

Studies in higher education focus on strategies to motivate and encourage students in this process of deep learning, often in small groups with intensive contact between students and teachers. Over the past decades the number of students in universities and in courses has increased which makes intensive contact with teachers more difficult. Therefore additional strategies are required to meet the goal of reaching deep learning. One of the strategies that became more relevant, also in relation to increasing student numbers in courses, is peer-feedback. The act of giving and receiving feedback between peers has a number of advantages: comments may be more accessible, students learn the criteria on which their own work will also be assessed and they will think more critically about the comments and suggestions received from peers in comparison with feedback received from teachers. As the feedback from a teacher is often interpreted as the opinion of an expert, it will often be accepted without much critical thinking.
The use of peer-feedback was recently shown to be an efficient strategy to stimulate deep learning in students in online courses (Van Popta et al. 2017; Filius et al 2018a, 2018b, 2019). These students were shown to think more critically, relate new ideas to everyday experience, relate ideas to each other and create new concepts.

The current project was focused on determining the relevance of peer feedback in campus-based higher education and to identify the optimal conditions in providing, receiving & discussing peer feedback. In this respect, the effect of anonymity and the relevance of discussing peer feedback online or face-to-face on deep learning was studied. In addition, educational material was developed to instruct students how to provide and receive peer feedback.

In this manual, being the result of a combined SURF- and USO-project, we will first provide you with a short overview of the latest literature on deep learning and peer feedback (Chapter 2). Here, you can find the academic sources that back up the peer feedback method we developed.

In Chapter 3, a method is provided for implementing dialogic peer feedback into your courses. This method has been piloted in 10 different courses within three different faculties. This study helped us to shape the method and provide you with the key sources to implement this into your course. From experience, we know that every course is different and all written assignments are different. It is therefore of upmost importance that you know which learning objectives you want to achieve with your assignment. Only when these goals are clear, you can start thinking about the process of implementing peer feedback. In chapter 3, an infographic illustrates all the steps of the method, plus extra tips on implementing all these different steps.

In Chapter 4, we present the design of two short workshops, already illustrated in the Infographic shown in the previous chapter, with the following aims: 1) to prepare students to give feedback in an effective and constructive way, 2) to assume an attitude to receive feedback efficiently and to pay special attention to the structure and clarity of argumentation in written assignments both when providing as well as in receiving peer-feedback. These workshops can be used in your course to help shape the written assignment. For each workshop you can find information for students as well as for teachers. The factsheet on "Peer feedback and deep learning" can be used as a handout for students, both to motivate them to provide feedback and as a short guideline with some do's and don'ts on how to give feedback in an optimal way. The factsheet for your fellow teachers may be helpful to provide them with some essential information on the benefits of peer feedback. For the second workshop, focused on preparing students to receive and discuss feedback, you can use the factsheet "Receiving & learning from peer feedback" as a handout to raise awareness about how to deal with criticism when receiving peer feedback and how think critically before using the feedback from their peers. For each of these two workshops you can also find some powerpoint slides which can either be used integrally or which can serve as a source of inspiration to design your own powerpoint slides.

In Chapter 5, we interviewed three different teachers who participated in this study. Their experience with peer feedback assignments in their courses, may serve as a source of inspiration for other teachers, who are considering the use of peer feedback in their own course. The interviews are in Dutch.

In Chapter 6, information is provided on some online tools to implement dialogic peer-feedback in your course. A Table is presented from which a tool can be selected which appears to be most optimal for the type of product you want your students to provide peer-feedback on. All of them have advantages but also specific limitations. In this Table, the tools that are currently most often used, like Peergrade, Feedback Fruits, Pitch2Peer and Blackboard, are compared based on a set of criteria. At the University Utrecht, Educate-it may help you in your choice and support you in using the tool. From what we heard, many teachers expressed positive experiences over the past three years with the tool Peergrade when using writing assignments, especially in courses with many students.
In addition, we share a **good practice** from our project. We have experienced that students are best able to provide peer feedback if they are analyzing the text of their peers using a pre-defined set of questions that will guide them to focus on the most important aspects of the paper. These questions have been formulated with the rubric and/or learning goals in mind that are used by teachers to assess the specific assignment. We include the set of guiding questions that were used in a level 2 course to help students focus on a variety of elements in the text when they were providing peer feedback on a draft version of a literature review.

In Chapter 7, we share some results of the two experiments which were performed in this study. In the first experiment in which 10 courses with 545 students participated, it is shown that students perceive deep learning not only when they provide and when they receive peer feedback, and to a minor extent when they discuss peer feedback.
In the second experiment we focused on the optimal design of the peer feedback process and especially on the role of anonymity in providing peer feedback as well as on the relevance of discussing peer feedback online or face-to-face. Here we can already indicate that most students, especially in their first years of the Bachelor, prefer to provide peer feedback anonymously. However, it is interesting to note that there is no difference in perceived deep learning when peer feedback is either provided anonymously or non-anonymously. With respect to discussing feedback, we found that a face-to-face discussion of peer feedback led to more perceived deep learning in comparison with discussing feedback online. Further details can be found in Chapter 7.

In Chapter 8, we reflect on the usefulness of defining peer feedback as an academic skill for which a learning progression might be developed. Our conclusion is that peer feedback can be used as a useful strategy or tool to enrich and intensify learning progressions of a variety of academic skills (such as academic writing, argumentation, presenting, cooperating, etc.). Peer feedback as such, however, should not be treated as a separate academic skill for which a learning progression should be developed. Further details for this statement can be found in this chapter.

In Chapter 9, we focus on sequential or cyclical peer feedback. In most courses peer feedback is implemented only once. Students provide feedback to their peers and the feedback which is received is then used to improve their writing assignment before it will be graded by the teacher. This strategy has repeatedly been shown to encourage deep learning both in online courses as well as in campus-based higher education. Much less experience has been obtained when peer feedback is implemented sequentially, aimed to gradually improve a writing assignment until an end product is reached. In the honours program at the Department of Biology (Utrecht University), sequential peer feedback (up to 4 rounds of feedback within a time frame of 8 weeks) has already been used for a number of years. During this program, a cohort of students are actively engaged in writing all chapters of a popular science book. Here, we share some results and experiences from a cohort of honours students with sequential peer feedback and whether it relates to perceived deep learning.

Finally, a number of Appendices are included in which some information is added that was used to evaluate the impact of peer feedback on deep learning and its mechanisms:

— In Appendix A, the questionnaire can be found which was used for students to be filled in during a course when the dialogic peer-feedback assignment was finished.
— In Appendix B, the set of questions can be found which we used in Focus group meetings with students to get an (qualitative) impression of the extent to which peer-feedback stimulated their deep learning.
— In Appendix C the summary of the PhD thesis by Renée Filius (Utrecht University) is provided, since these studies were the main inspiration of this project and further stimulated the use of peer-feedback both in online and on-campus courses.

We hope you enjoy this teacher manual and find inspiration in the various sources we have provided. In case you decide to implement peer feedback in your courses, we are sure that your students will not only appreciate the process of providing, receiving and discussing peer feedback, but also benefit from it in terms of deep learning.

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2 Promoting deep learning through peer-feedback practices in higher education; an overview.

Lisann Brincker and Fred Wiegant

Introduction

How students approach their learning has been shown to affect learning outcomes (Biggs & Moore, 1993; Biggs, 1999; Chin & Brown, 2000). Crucially, deeper engagement and subsequent understanding during learning rather than surface level memorizing correlate with academic success and student motivation (Dooley & Bamford, 2018). Numerous factors that may influence which learning approach a student utilizes at any given moment have been investigated in order to create educational environments that foster deep learning (Biggs & Tang, 2011). The popular practice of peer feedback is one candidate which may aid students in achieving deeper learning during their studies. Here, we examine how peer feedback may promote deep learning. We will first explore the dichotomy between surface and deep learning and the latter's apparent superiority with regards to learning outcomes before elaborating on factors that have been shown to promote deeper engagement during learning. With deep learning being the goal, we then investigate peer feedback practices as the means to reach it. We discuss how peer feedback may drive competencies that trigger and maintain deep learning, also touching upon the push to treat peer feedback as a loop activity, also called dialogic peer feedback. We end with a number of recommendations to set up effective peer feedback practices in higher education.

Deep learning superior to surface learning

While a large number of cognitive theories about learning have come forward over the last decade, constructivism is still on the forefront of learning research and has had an enormous impact on educational theory and practise. Within this framework, the student is considered to be constructing their own learning environment, actively engaging with input from their surroundings. Learning is seen as being rooted in the interaction between the student and the material of interest, and, even more importantly, in the interactions among students and between students and teachers (Chapman et al., 2005). In this context, a distinction between surface and deep learning has been made that has moulded the field of pedagogy with regard to both, instruction and examination (Biggs & Moore, 1993). It should be noted that this distinction is not a fixed behaviour. Students can decide to switch their learning approach.

In this dichotomy of learning approaches, *surface level learning* has a more negative connotation and is repeatedly shown to lead to poorer outcomes when it comes to understanding of concepts and retention thereof (Ramsden, 2003). It is related to a means-to-an-end attitude where the process of learning is considered a nuisance and only necessary to eventually pass an examination after which most of the supposedly acquired knowledge dissipates. Students engaging in surface level learning often expect to be given the important content by the teacher and have little motivation to explore the topic in more width or depth, making fruitful discussions with peers difficult to maintain (Platow et al., 2012). When observing and interviewing 8th grade students during confrontation with a number of science modules, Chin and Brown (2000) found that a distinction could be made between surface and deep learning. Students who employed the former, gave reformulations of the question and avoided referring to a possible central mechanism when asked to explain the relevant concepts. On a more positive note, surface learning can be useful to memorize facts and it is sometimes considered to be a prerequisite to reach a deep learning approach.

Deep learning refers to a process in which the learner recognizes the dynamic and interrelated structure of the subject under study and actively engages with it. It involves critical thinking, making new connections between different concepts and is marked by constant active integration of new information with old ideas (Gordon & Debus, 2002). Knowledge here is born less out of a transfer from expert to novice but out of the explorative nature of the interaction between teacher, learner and material. In the study conducted by Chin and Brown (2000), deep level learners elaborated on explanations of possible cause-effect relations between elements of scientific concepts and engaged in what they call "on-line theorizing". While students started explaining the mechanisms, they showed a lot more spontaneous utterances of insights and were more confident in pursuing these further. The primary motivation of somebody using a deep learning approach is not to learn in order to pass a test but to learn in an effort to increase the understanding of a subject and committing to put in the work it might take to do so. It often originates from a fundamental interest for the topic itself that is then amplified over the course of instruction (Ramsden, 2003). Even though receiving good grades is not the primary goal in this approach, engaging in deep learning has been positively related to academic performance as well as an increase and maintenance of student motivation (Azer et al., 2013; Platow et al., 2012). The latter is particularly intriguing as it suggests that facilitating and encouraging a deep-learning approach early on in a student's academic career may have a lasting effect on their determination to continue to engage in the discipline they have developed an interest for. Thus, it is desirable for the overall learning outcome that teachers encourage their students to get involved in deep rather than surface learning approaches.

"Deep learning involves critical thinking, making new connections between different concepts and is marked by constant active integration of new information with old ideas".

Factors promoting deep learning

Whether a student chooses a surface or deep learning approach depends on internal and external factors. Some of these factors are particularly suited to inform the design of educational environments in which students are encouraged and facilitated to engage in deep learning. It has been shown that students' attitude towards the acquisition of knowledge improves when they learn in a participative context (Chapman et al., 2005). After allowing time for trust and a sense of community to develop, students are often more willing to expose their uncertainties with regard to a specific concept. The following discussion and collaboration in identifying and solving the issue amongst peers and the teacher leads to a discourse that drives deep learning. Does the student intend on clarifying their uncertainty and is this clarification successful, they are subsequently more likely to follow such a deep learning approach again (Gordon & Debus, 2002).

"Teachers that see learning as a dynamic, constructive and integrative process are more likely to encourage their students to use methods that are connected to a deeper processing of materials such as group work or critical analysis".

Not only the students' attitude but also that of the teacher can influence the level of learning that occurs in a classroom. Teachers that see learning as a dynamic, constructive and integrative process are more likely to encourage their students to use methods that are connected to a deeper processing of materials such as group work or critical analysis (Gordon & Debus, 2002). They are also more likely to ask high-level questions that challenge students (Offir et al., 2008). Such questions are questions of analysis, evaluation and synthesis and those that prompt the students to expand from a specific fact towards broader hypotheses and principles. This also applies to the nature of the tests a teacher may use. When students know that they will be assessed using e.g. multiple-choice exams, they are less likely to employ deep learning approaches during their preparation for said test. When they expect essay questions or other types of assessment that requires them to explain principles and concepts and apply them to novel circumstances, using a deep learning approach becomes more economical than trying to memorize all potential scenarios on a surface level (Marton & Saljo, 1976). Crucially, using formative assessment (including feedback) rather than just summative assessment promotes deep learning by providing information about the current state of knowledge and the desired state of knowledge of the student (Moore & Teather, 2013). Most importantly, it suggests directions for improvement which encourage the student to evaluate their current work and monitor their following progress in working towards their goal (Rushton, 2005).

Peer feedback as a means to drive deep learning

One classroom activity that captures many of the above mentioned factors and thus might help students in utilizing a deep learning approach is peer feedback (Dooley & Bamford, 2018; Moore & Teather, 2013; Filius, 2019). Peer feedback has been defined as an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status (Topping, 1998). In this regard, it should be distinguished from peer-tutoring which often occurs between students that are different in age and skill and is a more unidirectional approach in which one individual teaches or helps another with a specific task (Reinholz, 2015). Ideally, peer feedback results in a set of suggestions that the receiver can use to improve their work before it is being graded. This makes it different from peer-assessment which involves peers grading each other's performance on the basis of relevant criteria, often provided by the teacher. The goal during peer feedback is establishing a collaborative dialogue between equals. Making grading part of the process, was shown to reduce the learning opportunities it provides (Liu & Carless, 2006). While the process of peer *feedback* is regarded as neutral or positive by many students, peer-*assessment* for a summative purpose traditionally elicits more resistance because students do not feel comfortable with being directly in charge of a peer's grade. As many students still struggle with accepting others' feedback, accepting their grading is even more difficult. Additionally, while it has been suggested numerous times that grading by students is moderately correlated with the grades a teacher would give, 'friendship marking' still skews peer grading results in many cases (Liu & Carless, 2006).

Reinholz (2015) elaborated on the elements of peer feedback in higher education, stating that it facilitates the development of three key academic competencies: (1) it provides grounds for critical thinking and *academic process reflection* in which students can reflect upon their own understandings of the content, the task and the aim of the task. (2) It allows for an *expansion and revision of conceptual knowledge* by giving students an opportunity to build on prior knowledge and integrate ideas they encounter in another's work. Additionally, they may practise to generate inferences and repair misunderstandings that occur in the process. Lastly, (3) students improve their *communication skills* during the process of collaboration in which they need to explain and back up their understandings of the task and the content. Actively engaging with their own and others' work, integrating new knowledge and starting a dialogue about the material are not only elements of peer feedback but are also indicators of deep learning (Biggs & Tang, 2011). Considering these parallels, the following sections discuss how each of these competencies can be driven and practised through peer feedback, thereby promoting deep learning in the classroom.

"Research on the timing of feedback has shown that it is most effective if it is given within a short time frame after the assignment was submitted. Reception and using of feedback is more tightly coupled in peer feedback scenarios as compared to receiving feedback from the teacher alone".

Academic process reflection. Peer feedback often occurs between writing the first draft for an assignment and submitting the final product which means that students have the chance to actually use the feedback they were given in order to improve. Additionally, research on the timing of feedback has shown that it is most effective if it is given within a short time frame after the assignment was submitted (Kulkarni et al., 2015; Prashanti & Ramnarayan, 2019). Reception of feedback and using of feedback is more tightly coupled in peer feedback scenarios as compared to receiving feedback from the teacher alone. This promotes learning within one project rather than from one project to the next as it is often the case with teacher feedback (Nicol et al., 2013). Because of time constraints students may only receive feedback on a final product e.g. by being graded or scoring a certain number of points within a rubric. Even if a more detailed evaluation is provided, there is no chance for students to work on it further as the current project is by definition concluded. Teachers may expect students to take something away from the assessment of their performance on project 1 to perform better on project 2. However, as there is no close temporal coupling between the feedback and use thereof and the connection between project 1 and 2 might not be very clear to students, it is unlikely that they will take much of the feedback received into their work on project 1 into account when starting project 2. Thus, making rounds of peer feedback a stable part of the curriculum provides the students with several opportunities to improve their work and monitor their progress from draft to final version within one project (Nicol et al., 2013). The context-independent skills they practise during that process can then be employed for the next project (Lynch et al., 2012). Interestingly, peer feedback may encourage more deep learning in comparison with teacher feedback. As students tend to question feedback from peers more, in contrast to feedback from their instructor, they continue to think longer and deeper, which enables deep learning (Filius et al., 2018b).

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Engaging in peer feedback seems to have a positive effect on academic self-regulation. Self-regulation of learning refers to students being able to identify their goals and manage their path towards reaching them by monitoring their motivation, cognition and behaviour in the context of an educational environment. Being asked to identify and evaluate the steps towards reaching those goals in another's work can make them more transparent in their own work as well (Nicol & Macfarlane-Dick, 2006).

Interestingly, students do not only benefit from receiving feedback after they have completed the same task they are reviewing. Cho and MacArthur (2011) found that students that were asked to review peer papers and subsequently had to write a paper of their own on a related topic outperformed their peers who just read the papers without commenting on them. Specifically, those students that added comments including problem detections and solution suggestions wrote papers of a higher quality. This suggests that the process of reviewing a peer's work alone provides the student with competencies that can be used favourably in a related assignment.

Expansion and revision of conceptual knowledge. When being confronted with somebody else's performance on a task the student himself has also previously worked on, opportunities for a rich discourse about the topic arise. Within that discourse, several steps of critical thinking will be employed. Students need to analyse and evaluate what they have

observed before identifying potential problems *and* offering constructive solutions. Being asked to critically review something makes students more aware of how others may critically review their products and enables them to take that step back when looking at their own work (Nicol et al., 2013). This skill then becomes context-independent and can be applied to (re)evaluating the structural elements of a paper or the interrelations between elements within a scientific concept. Recognizing that expansion and revision of conceptual knowledge is a dynamic and potentially infinite process encourages students to use a deep learning approach (Gordon & Debus, 2002).

This revision of knowledge can also occur on a very practical small scale. Chrispeels and colleagues (2019) conducted a study in which one group of students taught another group about the implications of the use of genetically modified organisms in the food industry. They found that opinions about this issue drastically shifted from pre- to post-teaching session. This indicates that peers can provide each other with convincing and valid information that is subsequently used to expand the knowledge of the receivers. Students in another study also benefited from peer feedback and the collaborative process it triggered during an introductory biology course with subsequent 10 minute presentations (Tal & Tsauhu, 2017). Several indicators for deep learning during and after the small group sessions were shown to be of importance: Students reported to feel driven to look for information after the group discussions that would help in designing the presentations. Many students were then triggered to reorganize their knowledge in such a way that its explanation would fit within the time frame.

"To encourage fruitful peer feedback, it appears useful to: 1) instruct how to provide peer feedback aiming for deep learning; 2) rate feedback, and therefore repeatedly reflect on the subject matter".

Lastly, the pedagogical relationship with a peer that holds no authority over the learner may prompt them to disclose questions and misconceptions more readily. This means that they can be rectified more efficiently than in any other context, aiding the student in discarding wrong information and developing a solid knowledge base (Topping, 2005).

Communication skills. For peer feedback practices to be effective, it appears as though a dialogue between the parties is crucial (Filius et al., 2018a, 2018b; Schilling et al., 2018). With peer feedback often being a group effort, students receive multiple comments on their work and are confronted with several different views, not only in the feedback they receive but also in the work of others they review (Topping, 1998). Deciding on whether or not they agree with the feedback and determining which elements they may want to incorporate can be facilitated through an ongoing discourse about the work that is subject to the feedback process and the feedback process itself (Schilling et al., 2018). Recently, there has been a push to see peer feedback more as a loop activity in order to increase learning opportunities by having groups of students work out kinks in their projects collaboratively which promotes deep learning. This problem-solving team-work seems to be an evolutionarily rooted drive as peer groups have always provided grounds for teaching and learning experiences (Brincker et al., 2019). Using this affinity, continuous reciprocal peer feedback could prove to be very effective and fits into the context of a social constructivist paradigm (Nicol et al., 2013). This may be especially fruitful in online education. While face-to-face instruction enables teachers to encourage student to engage with one another "then and there", in an asynchronous virtual learning environment, participation and communication can be limited. Designing a system in which peer groups give, react to and discuss feedback online can then provide grounds for effective collaboration (Hacker & Niederhauser, 2000) and facilitate deep learning (Van Popta et al., 2017; Filius, 2019).

In their studies, Filius et al. (2018a, 2018b) focused on peer feedback in online higher education (in SPOCs – Small Private Online Courses) as a teaching method and strategy to support deep learning. They were able to show that peer feedback promotes three factors of deep learning: 1) critical thinking, 2) making new connections between different concepts and 3) integrating what is learned with what is already known. In addition, four mechanisms were identified that trigger a deep learning approach: 'feeling personally committed', 'understanding one's own learning process', 'probing back & forth', and 'asking and providing relevant feedback'. Interestingly, they reported that the quality of the interaction is more important than the quality of the feedback itself. Hence, Filius et al. (2018a) indicated that to fully exploit the peer feedback, students should be actively engaged in feedback as a dialogue. The value of peer feedback, in addition to the one who provides peer feedback appears to result predominantly from the dialogue it triggers. Especially helpful to encourage fruitful peer feedback appears to be: 1) instruction to how one provides peer feedback aiming for deep learning; 2) by having to rate feedback, and therefore by repeatedly having to reflect on the subject matter. In a follow-up study, Filius et al. (2019) showed that, just like typed feedback, providing audio peer feedback in online education leads to deep learning. Especially "feeling personally committed" was suggested as an important mechanism, as audio peer feedback makes great demands on feeling personally committed and as a consequence, both feedback providers and feedback receivers learn deeply.

Setting up successful peer feedback practices in higher education

In order for peer feedback to be a useful educational activity that does indeed drive deep learning, certain circumstances need to be created that make it fruitful for both teachers and students. With it being a large part of many programs in universities around the world already, it is important to establish how it should best be approached and set up. First, we will investigate the impact of familiarity between peers on feedback quality. Even though peer feedback explicitly does not entail grading, asking students to rate another's work can be an emotionally taxing task which can lead to inadequate and vague input in order to 'be nice' rather than state what should be changed. Related to this is also the mode in which peer feedback is given. Nowadays, the process of giving feedback is often located online and not just in the online courses which are growing in popularity. Determining what can be done to ensure that high-quality dialogues about individual performances can occur in the virtual world is just as necessary as it is in an "Real Life" classroom setting. Lastly, we will discuss the influence of appropriate instruction and the type of language used when introducing and conducting the peer feedback process.

Interestingly, there seem to be two opposing views on the degree of familiarity and closeness between peers that is optimal for having them evaluate each other's work. Some argue that allowing time for building a strong sense of community is key to establishing a classroom in which good peer feedback can be given. Chapman et al. (2005) found that students are more willing to expose their uncertainties and appreciate their peers' opinions if they have gotten to know each other and developed a certain level of trust that they are all

working towards the same or at least a similar goal. Feedback arises out of interaction and if students do not feel comfortable participating in the activity, it is unlikely that fruitful discussions of each other's work will be held.

On the other hand, students within a classroom are less likely to rate each other as very good or very bad and often choose the comfortable middle between the two extremes even if this objectively does not reflect the true performance level (Liu & Carless, 2006). In this case anonymity may actually help when giving and receiving peer feedback. Lin (2018) conducted an online peer feedback study in which one group received and gave feedback with their names and profiles available and the other did the same completely anonymously. The anonymous group reported more cognitive (constructive) feedback and a more positive attitude towards the system. The other group showed more affective (supportive, opposing) and reflective feedback but did not report to have learned as much as the first group.
It seems as though a compromising solution may be that students are given time to develop a sense of community in which they trust each other but within this community, peer feedback is conducted anonymously. However, some teachers may want to establish a system in which peer feedback is part of the actual class hours where students would discuss their evaluations with one another. Then anonymity can no longer be granted, and other approaches may be necessary.

To reduce the impact that reciprocal rapport between familiar peers or even friends might have on the quality and honesty of their feedback, the language used during the process and on the forms that are often part of it may need to be adjusted. Nilson (2003) proposes that questions for peer feedback forms should move away from judgement and opinion and towards identification of main elements and attention to the details of the content and its presentation (i.e. asking "At what point did you identify the thesis of the paper?" instead of "Is the thesis of the paper clear?"). Reformulating questions in such a way removes their emotional load, giving students the opportunity to be more accurate in their evaluation while also providing additional scaffolding for the task itself. Going back to the above-mentioned example it may be that when students are asked about the location of the thesis within their peer's paper, they become more aware that this is something they should pay attention to in their own work. Determining the clarity of a thesis is a much more subjective task and it is likely that students may struggle to find a justification for why their peer's thesis is or is not 'clear enough' and how that would translate into a rating. This is also supported by studies showing that quality of student feedback increases when it is identified as a less dualistic task (this was good, this was bad) but rather as commenting on the learning progress on different levels where structure and content are considered separately (Gan, 2011).

"The anonymous group reported more cognitive (constructive) feedback and a more positive attitude towards the system. The non-anonymous group showed more affective (supportive, opposing) and reflective feedback but did not report to have learned as much as the first group".

In order to give appropriate feedback, students need to be able to identify the current level of achievement in their peer's paper and determine how it relates to the desired level of achievement (Moore & Teather, 2013). The latter can often be deduced from feedback-forms, rubrics or explanations of the task in the classroom. However, teachers should be aware that they might have to make the criteria more explicit in order for students to have a template against which their own and their peer's work can be evaluated (Liu & Carless, 2006). It may be helpful to have the entire class work on a good and a bad example of what the current task can result in. Discussing the differences between the two approaches can aid students in grasping the often fairly context removed peer feedback form questions in relation to their current objective. Teachers should schedule such instruction modules before peer feedback is introduced as a class activity and explain why and what kind of feedback is useful, otherwise students may not recognize its value (Gan, 2011) and struggle to work out what can be done to close any existing gap between their current level of performance and the desired one (Moore & Teather, 2013). In this respect, Filius et al. (2018b) showed that instruction on providing peer feedback, combined with assessment of the peer feedback received, lead to peer feedback dialogues, an improved quality of peer feedback and a better quality of the end product.

Reducing the impact of emotions and clarifying the goal and instruction of the peer feedback process can help to make it a more fruitful part of the curriculum in higher education. Depending on the circumstances, teachers may choose to keep the peer pairings anonymous or not, however, reformulating feedback forms and instructions to focus more on the specific content, structure and presentation of the work rather than asking students to judge how good or bad a certain element is should help in any case. Using these forms to provide students with some guidance and scaffolding for the task may already improve their own work by itself. The quality of the material that is then subject of the peer feedback process may turn out to be higher to begin with and can potentially elicit a more in-depth dialogue when the students discuss each other's work, driving their deep learning competencies.

Conclusion

When aiming for deep learning in the classroom, peer feedback activities appear to be a valid and effective means to reach this goal. Peer feedback, especially when it is looped and includes moments of collaborative discourse about the product under review, stimulates deep learning in both the provider and the receiver of peer feedback. After a sense of community is established, online or offline, peers are more open in sharing and rectifying their misconceptions and provide high quality feedback that significantly improves the work of the receiver. If set up correctly, peer feedback is regarded as a motivating, fun and useful experience which prompts students to engage in it more frequently, thereby creating more deep learning opportunities for themselves and others.

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3 Dialogic peer feedback; a short explanation of the method.

For the peer feedback intervention, indicated as dialogic peer feedback, we have designed an infographic that helps visualizing the different steps. As you can see in this infographic, there are three actors: the teacher, the student and the peers.
Each of these actors have specific roles during the peer feedback intervention, which consists of three different phases. Each of these phases contain small steps which are shortly characterized and explained.

PHASE 1: Explaining the assignment and submitting student work for peer feedback
PHASE 2: Workshop 1: Instruction & training of peer-feedback + Providing peer-feedback
PHASE 3: Workshop 2: Instruction on receiving peer-feedback + Analyzing peer feedback received plus discussing the peer-feedback, followed by rewriting of the assignment.

PHASE 1: Preparation

In this phase, teachers need to provide clarity on the learning objectives of the writing assignment (1). In addition, the teacher may indicate the procedure of the peer feedback method used in the course and provide some instruction on the online tool being used.

In this respect, we have to acknowledge that every course is different. In our project we have seen Bachelor-1 courses that paid a lot of attention to explaining the assignment and Master courses where only a short outline of the assignment and the type of peer feedback required was given. When properly instructed, students will write their paper (2) and submit it for peer feedback, often in an online tool (such as Peergrade or Blackboard).
DO: Understand your audience. What do students need in order to feel competent to do the assignment and motivated to start working on it? Maybe you need to spend some of your lecture time explaining why peer-feedback is useful and what kind of things you expect as a teacher. Maybe your students have a lot of experience with peer feedback and deep learning, so you can only provide your objectives and the fact sheet.
DON'T: Overestimate what students know about written assignments. Every assignment is different and the more clarity you give on the final objective (via feed forward). The more equipped they are to write a first draft.

PHASE 2: Providing

In this phase, teachers need to provide clarity on how to provide peer-feedback (in relation to deep learning). Optimally, a workshop (3) is implemented in the course, for which we have developed materials to help you: a short knowledge clip, a powerpoint presentation and a factsheet (see below for more explanation). These can help to shape student's understanding of why peer feedback and deep learning is important. Now students can start to provide peer feedback (4) in the online tool on the paper(s) that have been assigned to them. Peer feedback is usually provided in a structured way (which has explained by the teacher in Phase 1). In many courses, each individual student is supposed to provide peer feedback on the work of two fellow students. Often, this can be assigned as homework or within the context of a "werkcollege".
DO: Give the information in multiple formats (clip, powerpoint, factsheet). Students tend to appreciate the fact that they can watch or read the (already given) information, just before or during the time period that they are providing peer feedback. As a teacher, it is extremely powerful to explain students what it is they can gain by providing peer feedback. For instance that it not only stimulates critical thinking and deep learning, but that they also benefit in terms of becoming inspired on how to improve their own paper, in understanding more clearly the way their own paper will be qualified, etc.
DON'T: Overestimate students' experience. Most students have had some experience with providing peer feedback, but might not have taken the context of the whole process into account. In this sense, it is important to also emphasize the benefits of peer feedback as indicated above.

PHASE 3: Receiving and discussing

In this phase, the focus is on receiving and responding to the feedback (5-8). This final step is crucial in order to reach the full benefit for the receiver. Only when students are required to react to the peer feedback received, they will need to think critically about whether or not the suggested improvements are really meaningful and worthwhile to implement.
The receiver of feedback should also be able to ask for clarification to which the provider

can then respond. This may encourage an academic dialogue.
To prepare students for this important step (5) and to encourage them to reflect and react to the feedback received (6), it is useful to provide them with some additional information, preferably in the context of a workshop or "werkcollege" (5). This can be explained in a short powerpoint presentation, a knowledge clip (see below) and/or in a factsheet which can be provided as a handout. In this handout "Receiving and learning from peer feedback", we have described some examples do's and don'ts on how to react to peer feedback, ask for additional information. After the actual discussion and reflection (6), students can make a plan on how to improve their text based on the peer feedback received, rewrite their text (7) and finally submit their final version (8) for grading by the teacher.
DO: Encourage to seek the dialogue. Research shows that dialogic (peer) feedback is a powerful tool for deep learning (For more information, see Chapter 2).
DON'T: Underestimate the difference between anonymous and non-anonymous peer feedback. Depending on the tool that you have chosen, students might need to provide non-anonymous feedback. From our focus groups, we have heard that bachelor students in their first year(s) can feel anxious about that. More information on the role of anonymity in providing and receiving peer feedback can be found in the experiment we performed on this aspect which is described in Chapter 7b.

The various elements can be found at the database of the Centre for Academic Teaching (CAT) at Utrecht Universiy. We hope that with the material provided, you will be able to implement peer feedback in your own course(s).

Deep Learning through Peer Feedback

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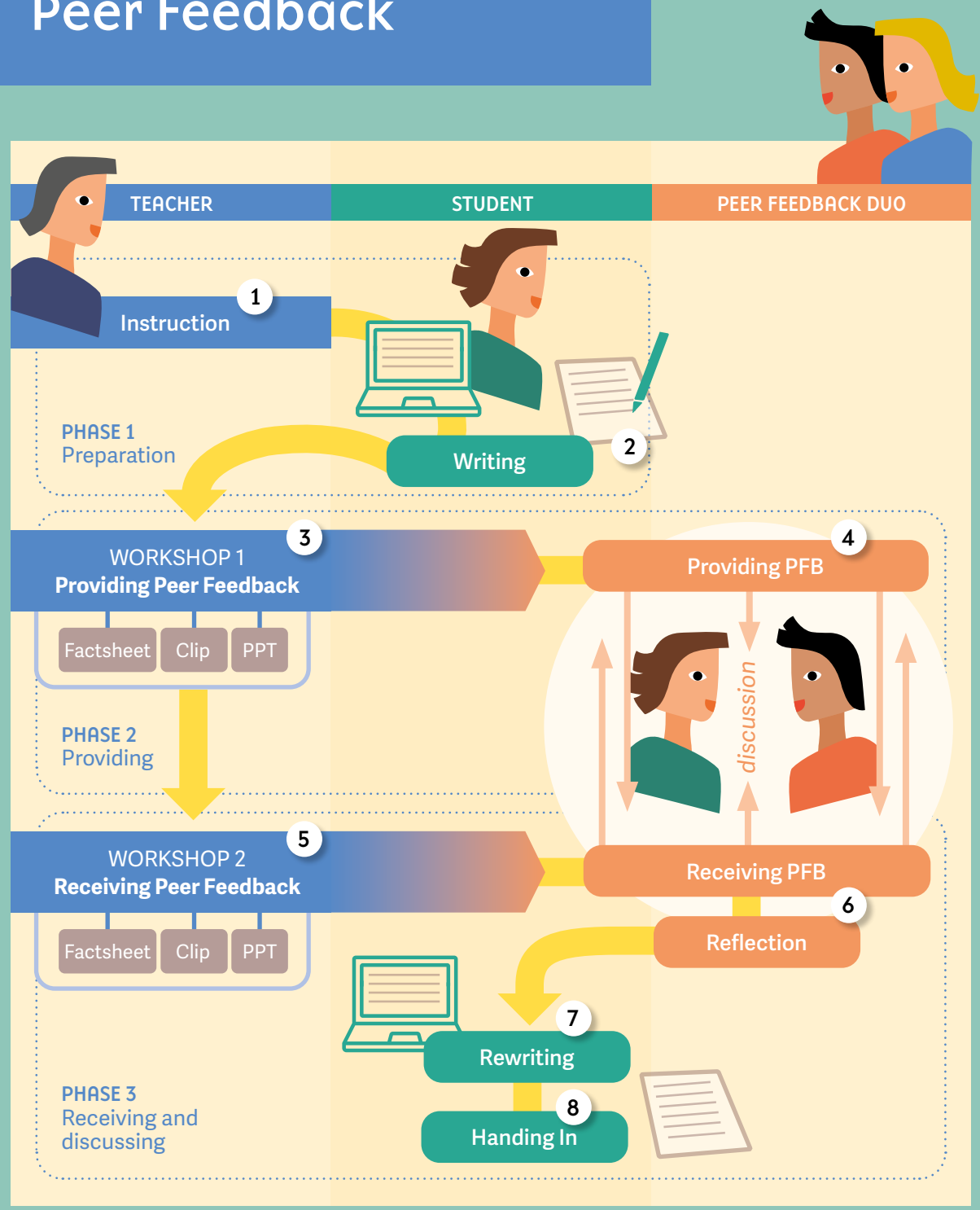


4 Workshops and material to support Dialogic peer feedback; an overview.

In order to cater to your needs for implementing the dialogic peer feedback in your course, we have provided important information for your students about the process in different formats. We strongly suggest using the powerpoints provided during your course. This way you will be able to better connect the assignment to the rest of the course. However, we have also developed a knowledge clip that you can share on your learning platform and that students can watch at home. Also, we have developed some factsheets for bot providing and receiving peer feedback. In addition, we developed a factsheet for your fellow teachers to explain the relevance of peer feedback in general. Finally, we share some links to useful Clips to facilitate the process of Dialogic peer feedback.

WORKSHOP/WERKCOLLEGE 1: How to provide peer feedback

This short workshop provides students a reason why they need to learn how to give peer feedback, what we mean with deep learning and how they need to provide peer feedback. Tips are given on providing feedback on different elements of an assignment, such as an academic text and they are informed on how to use the right tone of voice in their peer feedback.

In the following pages, you'll find the material indicated below, which can be used integrally or as a source for inspiration to design your own material. The material can also be found at the following site of the Centre for Academic Teaching (CAT-UU):
https://cat-database.sites.uu.nl/knowledge_item/dieper-leren-door-online-peerfeedback

— Powerpoint to instruct students on the peer feedback process and on **providing** peer feedback (with comments for the teacher beneath the slides),
— A knowledge clip which explains the powerpoint
— A factsheet for students on the relevance of providing peer feedback in relation to deep learning, with some do's and don'ts.
— A factsheet for teachers with some background on peer feedback and with some tips for implementation of the peer feedback process in your course.

Meanwhile, if you want to provide students with other sources, you could have a look at the sources below:

— Videopitch Renée Filius about research on deep learning via peer-feedback: **www.youtube.com/watch?v=2lLPzLOtFKQ&t=1s**
— Improving learning via peerfeedback – Uitgeverij Deviant: **www.youtube.com/watch?v=K6lwCliDz0A**
— Knowledge Clip on peer feedback: **www.youtube.com/watch?v=EgQIq7Fds4g**
— Interview with Esther van Popta, on the benefits of online-peer feedback: **https://lerenvantoetsen.nl/de-kracht-van-online-peer-feedback-interview-met-esther-van-popta/**

WORKSHOP/WERKCOLLEGE 2: How to receive peer feedback and to get involved in an academic discussion

This workshop provides students tools to receive peer-feedback. Receiving feedback is never easy, and students may become quite anxious or frustrated. However, we have developed some tools for students to help them take some distance and to make them aware that the feedback in principle should be interpreted as constructive in nature, that they should remain critical and use the relevant elements of the feedback to their advantage in order to improve the final version of their assignment. This may also help them to realize how important emotion management is, in order not to lose the focus: It is possible that the tone of the feedback is somewhat invalid, but the message behind the feedback can be true and useful.

Therefore, we give tools to critically analyze the peer feedback received and to make a plan for communicating some elements with their peer(s).
After the discussion students are asked to make a plan to start working on their final draft, in which they take into account: what feedback will they use and what will do they not use to improve their work, what do they need to focus on first and what are they going to do last. We have experienced that this type of exercise is quite difficult for first year students. Therefore we have provided you a Good Practice from our project, where students are helped with every step of the way following the receival & discussion of peer feedback, with very good results!

In the following pages, you'll find the material indicated below (and which can be found on the CAT-UU link as mentioned before), which can be used integrally or as a source for inspiration to design your own material:

— Powerpoint to instruct students on **receiving & discussing** peer feedback (with comments for the teacher beneath the slides),
— A knowledge clip which explains the powerpoint
— A factsheet for students on receiving peer feedback, with some do's and don'ts.
— A Good practice on analysis of peer feedback received and on making improvements in the assignment before submitting the final version.

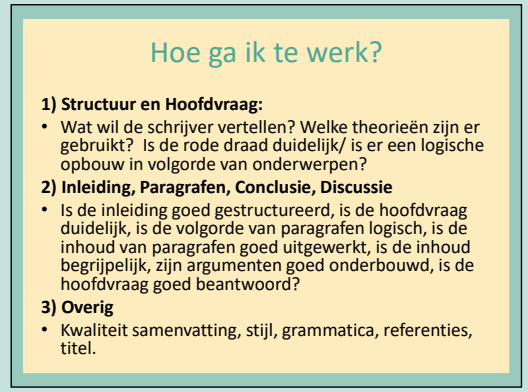
WORKSHOP 1

Powerpoint to instruct students on receiving & discussing peer feedback (with comments for the teacher beneath the slides),

1

2

3



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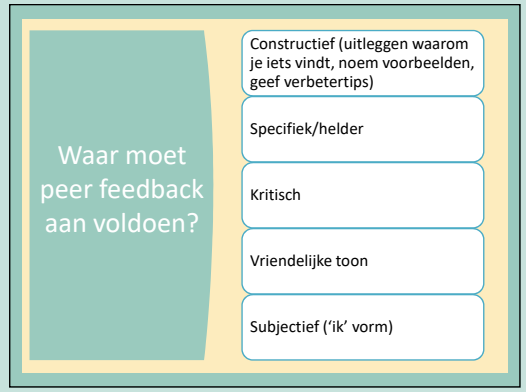

5

WORKSHOP 2

Powerpoint to instruct students on receiving & discussing peer feedback (with comments for the teacher beneath the slides),

Workshop 2
Ontvangen van peer feedback & voeren van academische discussie

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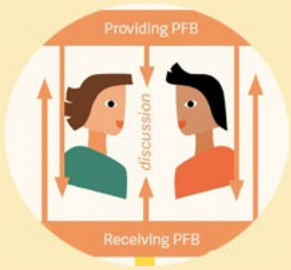
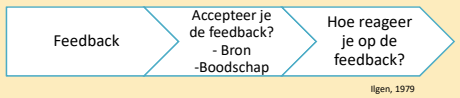
1

Help! Ik ga peer feedback ontvangen.



2

Hoe leer ik van peer feedback?



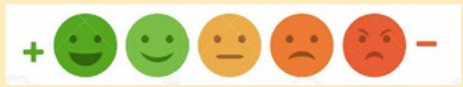
Ilgen, 1979

3

Hoe accepteer ik peer feedback?

Emotiemanagement voor diep leren:

- Emoties zitten regelmatig in de weg om de boodschap van je peer te begrijpen.
- Realiseer je dat de feedback niet gegeven wordt aan jou, maar op je stuk.



4

Wat roept deze feedback bij je op?

A:
You're wrong to choose this approach to the case. It would be better for the teacher to just call the parents about this issue, rather than making a report to a local agency.

B:
I have to respectfully disagree with your approach to this case. As outlined by Smith (2010), chatting with the parents about this issue, rather than making a report, could increase the risk of harm for the child.

5

Hoe analyseer ik Peerfeedback?

- Bekijk *kritisch* de kwaliteit van de peer feedback:
  - Globaal/Specifiek
  - Mening of feiten
  - Helderheid, details, voorbeelden, logisch, overtuigend
- Wat is de *kernboodschap*? Wat wil de feedback gever duidelijk maken?
- Hoe verhoudt de feedback zich t.o.v. andere feedback? Leg *verbanden* tussen de feedback.

6

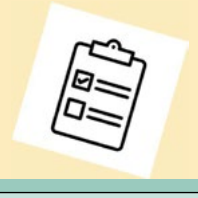
Aangaan van de academische discussie

- Vragen om verduidelijking, wees kritisch en scherp in je vraagstelling.
- Weten wat je van de ander wilt horen

7

Na de discussie

- Bedenk welke elementen je wilt verbeteren
- Maak een werkplan!



8

Student factsheet

Peer feedback & Deep learning

Over the last decade, peer feedback assignments have become more common in many universities. Research has shown that it improves your learning, your writing and your grades. This factsheet is designed to explain why peer feedback is beneficial and how to make sure you get the most out of it.

Benefits of peer feedback

✔ **Improve your own work**
A fresh set of eyes can tell you whether your main question is clear, your argumentation is logical, and your conclusion is sound. They might also catch spelling and grammar mistakes. In addition, peers often use a language that is more accessible and specific than that of your teacher.

✔ **Practice your critical thinking**
You don't agree with the feedback you received? Good! You shouldn't take everything others say for granted. You can ask your peer to clarify what they meant and discuss your differences. You may find that they can give you some good reasons to re-examine your work.

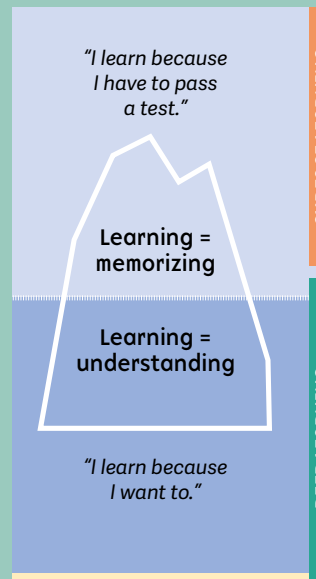
✔ **Reflect on your academic process**
Looking at your peer's approach to the same assignment gives you the chance to reflect on your own understanding and execution of it.

✔ **Expand and revise your knowledge**
You may come across some valuable insights and references in your peer's work that you had not considered before.

✔ **Use your communication skills**
Peer feedback creates a dialogue in which you might need to explain and back up your understanding of the assignment and the material you or your peer worked on.

✔ **Avoid procrastination**
If more feedback sessions are organized at several points between the first draft and the final version may help to keep you on track and finish your work on time.

Taken together, all these elements promote deep learning. You can find out what exactly that is and why it is important in the box on the right.



SURFACE LEARNING

- ✔ Focus on facts relevant to examination
- ✔ Reliance on teacher to provide important information
- ✔ Little motivation to explore topic beyond the bare minimum
- ✔ Majority of what was learned is forgotten as soon as it is no longer relevant (e.g. after test)

DEEP LEARNING

- ✔ Focus on underlying central mechanisms
- ✔ Knowledge gained through explorative interaction between teacher, learner and material
- ✔ Independent investigation of the topic that goes beyond what is necessary
- ✔ Concepts remain accessible long-term and can be modified if new information is encountered

Deep learning

In schools and universities around the globe, teachers aim to provoke deep learning processes in their students because it results in understanding rather than just memorizing. Unfortunately, it is difficult to simply make deep learning happen on command. Many promoting factors such as the nature of your test or your teacher's attitude are beyond your control. However, you can prompt yourself into a deep learning process by seeing the acquisition of knowledge as dynamic and interactive. Giving and discussing peer feedback stimulates critical thinking, helps to integrate new knowledge with what you already knew and facilitates making new connections. Research has shown that discussing a topic with others, rather than just reading about it silently, promotes deep learning. Peer feedback can be used to bring about such a discussion and deep learning process, improving your retention of the material and helping you to apply it to new situations.

You might not deem all new information you encounter during your studies "worthy" of deep learning. However, keep in mind that many courses in university are built on one another and the assumption that you expand your knowledge of a subject and incorporate new information from higher levels continuously. Employing deep learning strategies early on can make understanding more complex concepts in higher levels easier.

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IN SHORT

SMALL PICTURE
Peer feedback gives you the option to correct mistakes and improve your work before you submit it.

BIG PICTURE
Peer feedback trains critical thinking about your own and other's work, helps you improve your academic process and prepares you for dealing with constructive criticism.

Giving good peer feedback

Giving good feedback in general can be hard. However, using yourself as a guideline can give you some inspiration: What kind of feedback do you find most useful? Which comments helped you improve your work the most? Which ones did you struggle to incorporate? Answering these questions for yourself should already provide you with some basic ideas.
You may for instance prefer to receive feedback on the introduction and clarity of the main question, the structure of your paper, on argumentation and readability, rather than grammar and spelling.

This table elaborates on some of the do's and don'ts of peer feedback you should consider.

DO'S	EXAMPLE
Focus your feedback on the task, not the learner.	"You reach a conclusion without elaborating on step X and Y." instead of "You are always jumping to conclusions without explaining anything."
Elaborate on why you are giving this feedback.	"Your title gives good insight in what the text will be about!" instead of "Great title!"
Present elaborated feedback in manageable units.	"I would move this paragraph to the beginning to make the structure of the discussion clearer." instead of "Your discussion is missing structure, please rewrite."
Be specific and clear with feedback message, preferably linking your feedback to the criteria.	"One of our criteria is about spelling. I saw some mistakes in the introduction (example). Don't forget to spell check your text."
Promote a learning goal orientation via feedback.	"I think Hattie is using a different definition of efficient feedback." instead of "Please look at page 187 of Hattie's book for the right definition of feedback."
DON'TS	**EXAMPLE**
Do not present feedback that discourages the learner or threatens the learner's self-esteem.	"Did you actually understand the assignment?"
Avoid using unexplained praise.	Instead of "This looks great!", try to indicate what is good, such as: "The format you used really supports the flow of the text."
Avoid using progressive hints that always terminate with the correct answer.	"You used a wrong quote. It should be [correct answer]."
Minimize use of extensive error analyses and diagnosis.	Instead of changing words in the text or commenting on every sentence, try to summarize small but comparable mistakes with an overarching advise.

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Teacher factsheet

Peer feedback; info for teachers

In many classrooms around the world teachers aim to provoke deep learning in their students in an effort to ensure that they understand rather than just memorize a concept. In recent years, peer feedback has been considered as a potentially facilitating activity during this process. This factsheet places peer feedback in the context of deep learning and summarizes what is known about effectively introducing, explaining and structuring peer feedback activities in higher education.

What is peer feedback?

Peer feedback is defined as an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status. They then share their insights in written or oral form but do not grade each other.

What does it offer?

It is an educational tool that is being utilized in many universities already, often to give students an opportunity to receive feedback in larger classes where the teacher may not be able to review everybody's work in detail before the final submission. Recently, peer feedback has gotten renewed attention in the quest for deep learning in higher education. It is beneficial for the development of key academic competencies of all participating students, providers and receivers of feedback alike, especially if they get involved in an academic discussion.

Academic process reflection
By analyzing a peer's work, students reflect upon their own understanding of the assignment and its content. Regular timely feedback at different stages of the process enables students to improve their product and monitor their progress continuously.

Expansion & revision of knowledge
Students may integrate ideas they encounter in another's work into their own conception of their subject. This provides an opportunity for academic discourse when the feedback is discussed, which stimulates critical thinking, helps to integrate new knowledge as well as to make new connections.

Communication skills
Students practice formulating their ideas concisely and explain or back up their understanding of the task and content when facing opposing views.

How does it promote deep learning?

Many of the driving forces behind deep learning can be ignited and maintained through peer feedback activities.

- ✔ **Participative environments** improve attitude towards learning, acquisition of knowledge and willingness to collaborate.
- ✔ **High-level questions** that ask students to analyze and evaluate a text demand employment of critical thinking.
- ✔ **Providing peer feedback** gives students an idea about their current and desired state of knowledge, while also providing direction for improvement, prompting them to evaluate their own work.
- ✔ **Receiving peer feedback** challenges critical thinking as students often do not accept advice easily from peers.
- ✔ **An academic dialogue** between provider and receiver of peer feedback further stimulates deep learning.

The above-mentioned items are somewhat automatically a part of most peer feedback activities. There are some additional factors, that play a role in deep learning, that may appear less directly linked to peer feedback. However, they do become more relevant over time in a long-term context.

- ✔ **Past success** of employing deep learning strategies increases the likelihood that students will use them again.
- ✔ **Student intention** may change from memorizing to wanting to understand the material as deep-learning strategies are successfully applied.

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Universiteit Utrecht

The Feedback loop

Recently, there has been a push to see peer feedback as a loop which increases learning opportunities for students. They not only provide peer feedback, but they also react to the feedback received either online or face-to-face, where they engage in an academic dialogue. This turns the process into a more collaborative effort which promotes deep learning.

Making peer feedback effective

In order for peer feedback to be a useful educational activity, certain circumstances need to be created that make it fruitful for both teachers and students. The table below lay out some ideas about introducing, explaining and structuring peer feedback that have been shown to improve its overall quality as well as students' willingness to engage in it. They are presented in pairs of problems, that may come up before, during or after the process, and possible solutions. Some of the solutions may seem like common sense, however, it is important to remember that giving and receiving feedback is difficult and students may need more explicit guidance than you would expect.

	PROBLEM	SOLUTION
BEFORE	Students do not know how to give (good) peer feedback.	Provide ample information (e.g. factsheet) about what peer feedback is and how to give feedback in an academic context. Whenever quality of feedback is low, it is often because students simply "do not know better".
BEFORE	Students do not see why giving feedback is relevant.	At university, students may demand and have the right to know *why* they get certain assignments. Presenting scientific evidence about how this activity contributes to their academic development can increase their motivation.
BEFORE	Students are hesitant to engage in peer feedback when there are big skill and/or effort discrepancies among their classmates.	It is important to point out that *giving* peer feedback is just as valuable for academic improvement as *receiving* peer feedback. There may well be quality differences in the feedback, however, these should then be explicitly discussed afterwards to ensure that both, higher and lower skill/effort students benefit. Additionally, pairs/groups should be regularly shuffled to avoid stagnation of the feedback process.
DURING	PROBLEM	SOLUTION
DURING	Students are vague in their feedback.	Reformulating instructions and rubrics from vague into specific prompts can help students elaborate on their feedback. Questions such as "At what point did you identify the main research question of the paper?", or "What is the main question according to you?", are easier to answer than "Is the main question of the paper clear?".
DURING	Students are too "nice" or too "mean".	Students should be asked explicitly to reflect on what kind of feedback *they themselves* find most helpful. They also need to know that feedback is not always critique but positive elements should also be pointed out.
AFTER	PROBLEM	SOLUTION
AFTER	Students do not discuss the feedback they gave and received.	It is vital to make time during class hours for students to discuss the feedback they gave and received as well as the peer feedback process as a whole. Once students are comfortable and confident about the process, these discussions may happen independently of class hours.
AFTER	Students do not incorporate the feedback they received.	If students receive feedback from different peers on different tasks it is likely that they start recognizing its value automatically. However, whether they want to incorporate the feedback remains their choice.
AFTER	Students do not agree with the feedback they received.	Students should be given a chance to discuss their disagreements about their own or others' work. Such a discourse results from and in critical thinking which is an important element of deep learning.

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Student factsheet

Receiving & learning from peer-feedback

Receiving feedback can be a delicate matter. It's not easy to strike the balance between valuing the others' input and evaluating its usefulness for your writing.

Do's and don'ts

To be able to do that, you need to emotionally distance yourself from the process. It helps to take a moment to deliberately switch to a professional attitude when receiving peer-feedback. If you do find yourself becoming defensive or insecure, take some time to let those feelings go, so you can return to constructive work.

Peer-feedback is a form of team-work with the aim to help you. This works best if you listen openly and communicate well with your peer. To get the most out of the process, you can already take measures when you submit your writing in the first place: make sure you have done all you can to improve your text and possibly indicate on what aspects you still need help with. You can do this via highlighting, comments or a list of questions. This helps both your peer and you to concentrate efforts on helpful feedback. However, your peer will also see things you may not see, so keep an open mind and take any feedback into careful consideration. Even if you receive positive feedback, try to remain critical and consider whether specific parts of your assignment still need some improvements.

This table sums up some do's and don'ts of receiving peer-feedback that might be helpful.

DO'S	TIPS
Interpret feedback in reference to your product, not to you personally.	"You need to find stronger arguments for point X" means: "arguments for point X aren't good enough", rather than "your argumentation skills aren't good enough"
Take time to step back and let the feedback sink in.	Digesting feedback takes time. After you've read through all of it, do something else for a while or sleep over it, then return with a fresh view.
Make sure you understand the feedback you get.	Feedback can be vague, or otherwise hard to work with, for instance "this paragraph isn't making sense". If you're not sure, keep asking for explanation until you find the feedback helpful.
Realize when feedback is not helpful for improving the quality of your writing.	All feedback is subjective. If you decide to reject a point of criticism, make sure to do this in a respectful way and explain your motivations. This shows your appreciation for your peer's efforts and can also build confidence in your writing.
Incorporate feedback strategically, working your way from big- to small-impact changes.	Turn to structural and content-related issues first ("re-organize these paragraphs"), then to the fine-tuning, ("this sentence needs shortening").

DONT'S	TIPS
Avoid ignoring or harshly criticizing feedback.	Instead of ignoring feedback, you could say "I don't know how to incorporate this. Can you give me a suggestion?". Instead of "This comment doesn't make sense", you could say: "I don't know what you mean here, can you elaborate?"
Don't give up when you receive overwhelming feedback.	Instead of thinking "I might as well start over, or just leave everything as it is", turn to your peer: "I don't know where to start. Can you give me an indication of priorities to your comments?"
Don't hold on to what holds you back.	Sometimes you have to kill your darlings. Why not collect them in a separate doc for later use?

Universiteit Utrecht

OPDRACHT
Analyse van de ontvangen peer-feedback:

Jullie hebben inmiddels feedback gegeven op twee verslagen en jullie ontvangen vanavond van twee medestudenten feedback. Ga altijd kritisch om met de feedback die je krijgt. Klopt de feedback volgens jou? Ben je het ermee eens? Is de feedback relevant? Ga je jouw miniscriptie aanpassen naar aanleiding van de peerfeedback?

Bij het lezen van de feedback die je hebt ontvangen is het goed je weer te realiseren dat goede feedback aan de volgende eigenschappen moet voldoen:

— Constructief (uitleggen waarom je iets vindt, voorbeelden noemen, verbetertips)
— Specifiek/helder
— Kritisch
— Vriendelijke toon
— Subjectief ('ik' vorm)

Om deze opdracht goed te laten verlopen, moeten jullie de onderstaande stappen in Peergrade volgen.

1. Zodra de feedback open staat, lees je de feedback kritisch door en geef je hier commentaar op. Dit doe je eerst voor de feedback van persoon 1, dan persoon 2. Als je bij deze twee feedbackgevers commentaar hebt gegeven, wordt de feedback van beide personen pas tegelijk zichtbaar. Maak bij het geven van commentaar op de feedback gebruik van de volgende mogelijkheden:
   — Geef een "Like" als de feedback behulpzaam is.
   — Stel een vraag aan de feedbackgever als de feedback niet duidelijk is, dit doe je door een antwoord op een vraag te "flaggen".
   — Geef commentaar als je het niet eens bent met de feedback, ook door te "flaggen'.
   — Op het eind worden twee vragen gesteld over de feedback. **Het beantwoorden van deze vragen is verplicht!** Dit telt ook mee met het cijfer voor de feedback.
      - De eerste vraag is een multiplechoicevraag "How useful was the feedback?", beantwoordt deze vraag zo eerlijk mogelijk.
      - De tweede vraag is een open vraag "Additional comments". Jullie moeten hierbij een stukje tekst typen waarin jullie aangeven in welke mate er aan de onderstaande punten wordt voldaan met een toelichting erbij:
         - Constructief (uitleggen waarom je iets vindt, voorbeelden noemen, verbetertips)
         - Specifiek/helder
         - Kritisch
         - Vriendelijke toon
         - Subjectief ('ik' vorm)

2. Kijk of er vragen zijn gesteld over de feedback die jij hebt gegeven op een miniscriptie. Beantwoordt deze vragen zo goed mogelijk.

3. Vergelijk de peer-feedback die je hebt gekregen. Vul vervolgens het verbeterpuntenplan van je verslag in op de volgende pagina.

Verbeterplan Miniscriptie naar aanleiding van de peer-feedback

Naam student:

Benoem de twee punten waar de meeste feedback op is gegeven in jouw verslag:
1.

2.

Schrijf in elk kader welke punten je voor je eindversie wilt verbeteren:

Titel / Inleiding

Middendeel

Discussie/ Conclusie

Onderschrift figuren

Schrijfstijl

Overig

4. Lees hoe studenten jouw feedback hebben beoordeeld, welke drie punten vallen daarin het meest op:
   1.

   2.

   3.

✔ **Lever deze opdracht in op Blackboard**
→ inleveren opdrachten → Analyse peerfeedback → naam file: Verbeterplan-jouw naam
(of stuur deze naar het email adres van de docent: f.a.c.wiegant@uu.nl)

5 Interviews: Ervaringen van docenten met peer feedback

In het project “Diep leren door Online Peerfeedback” hebben docenten deelgenomen met zeer diverse cursussen. Om inzicht te geven in het docentproces, zetten we nu drie docenten in de spotlights wier cursussen erg uiteenlopen in opdrachten, omvang of inzet van tools.

De lessen die wij, op basis van hun ervaringen, in elk geval kunnen trekken zijn:

— Goede uitleg voor studenten over het waarom en het hoe van feedback is cruciaal. Alleen als je studenten uitlegt wáárom je hen peer feedback laat geven, wat zij er aan hebben en op welke wijze zij het meest effectief feedback kunnen geven en ontvangen is, zullen ze het ook serieus gaan doen.
— Je moet het peerfeedbackproces integreren in je cursus, anders is het niet effectief.
— Jong geleerd, oud gedaan: investeer vroeg in je curriculum om studenten de kneepjes van de peerfeedback aan te leren. Daar hebben zij, en jij als docent, de rest van de bachelor/master veel profijt van.
— De gegeven feedback onderling laten bediscussiëren is enorm waardevol. Reserveer hier tijd voor in je werkcolleges, zodat studenten dit online of (beter nog) offline kunnen doen.
— Als studenten ruimte krijgen om hun gegeven feedback verder te bespreken middels een discussie werkt dit dieper leren in de hand.

PROFIEL
André van der Velden

Departement: Media & Cultuurwetenschappen
Niveau studenten: Eerstejaars bachelor
Groepsgrootte: medium >20
Gebruikte tool: Blackboard

Hoe heb je de peerfeedback in de cursus vormgegeven?

1. (Werk)college: Ik geef een introductie over de opdracht en het hoe en waarom van peerfeedback.
2. Werkcollege: Alle studenten oefenen door feedback te geven op een oud, zeer slecht stuk van een aantal jaar geleden. Zo krijgt zelfs de zwakste student een succeservaring.
3. Online: Inleveren van eigen stuk (op Blackboard).
4. Online: Studenten moeten online peer feedback geven. Dit vindt plaats in deelgroepjes, niet anoniem. Eventuele vragen stellen n.a.v. de feedback gaat ook online.
5. Werkcollege: Ik geef generieke feedback op een deel (ca. 20%) van de stukken die de studenten hebben ingeleverd.
6. Werkcollege: De studenten krijgen nog een half werkcollege de tijd om hun ontvangen feedback face-to-face te bespreken met hun peers.
7. Online: studenten verwerken de ontvangen en besproken feedback in een eindversie (waarbij ze ook ter inspiratie gebruik kunnen maken van een rubric). De eindversie wordt ingeleverd en door de docent beoordeeld.

Wat is je ervaring met het organiseren van de peer feedback?

Ik gebruik Blackboard om studenten in kleine deelgroepjes aan elkaar te koppelen. Dit werkt goed voor het geven van peer feedback en in principe om daarna op de feedback te kunnen reageren.

Wat is je ervaring tussen de feedback online versus de feedback face-to-face?

De discussie online over de ontvangen peer feedback heb ik vrijgelaten. Dit betekende concreet dat enkele studenten nog op en neer online vragen stelden over de feedback. Toch merkte ik dat het ook nog veel winst opleverde om ze nog een kwartier de tijd te geven tijdens een werkcollege om de laatste vragen face-to-face te stellen. Dan kom je sneller tot een diepere discussie.

Wat vonden de studenten ervan?

Eerstejaars studenten vinden het in het begin lastig, maar vinden het fijn om te leren dat “niemand iets stoms kan zeggen”. Ik leer hen dat peer feedback in het hart van de academische gemeenschap zit: stukken delen, ideeën delen, feedback en kritiek geven. Uiteindelijk lijken eerstejaars zelfs vrijer om hun mening te geven dan studenten later in hun studie.

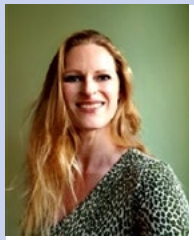
Interessant is ook dat internationale studenten meer moeite hebben met peer feedback.

Zij voelen zichzelf doorgaans nog niet competent genoeg om feedback te geven en verwachten ook weinig zinvolle opmerkingen van hun peers. Alleen de docent is in hun ogen degene die met expertise feedback kan geven. Ze voelen zich daarnaast erg ongemakkelijk om hun werk aan peers te laten zien. Het is goed om je hier als docent bewust van te zijn.

Heb je tips voor docenten die peerfeedback willen inzetten?

— Zorg voor een sterke integratie van peer feedback in je cursus. Je moet er tijd voor inruimen en er gewicht aan toekennen, zodat studenten het serieus nemen.
— Goede introductie van het hoe en waarom van peer feedback aan het begin van de cursus is cruciaal voor hoe studenten ermee om gaan. Een positieve sfeer in het werkcollege is van groot belang, studenten moeten zich vrij voelen in hoe ze zich uiten.
— Als je peerfeedback goed in je cursus integreert, merk je dat de kwaliteit van het schrijfwerk omhoog gaat, de schrijfopdracht serieuzer wordt genomen, dat er een betere dialoog wordt gevoerd tussen de studenten en studenten bewuster om gaan met de beoordelingscriteria, omdat ze die ook beter begrijpen. Dit resulteert in een dieper leren van studenten en hogere cijfers: het gemiddelde cijfer voor de schrijfopdracht in mijn cursus ging met 0.9 punt omhoog. Iets wat ik zelf niet voor mogelijk had gehouden.
— Wanneer je in jaar 1 het peerfeedbackproces goed uitlegt en echt rigoreus aanpakt, heb je winst voor de hele opleiding. Maar denk wel goed na over HOE je peerfeedback inzet in de verschillende cursussen. Het moet geen trucje worden, dat hebben studenten snel door. Breng dus variatie aan in de manier waarop peer feedback wordt toegepast. In het 2e jaar deel ik bijvoorbeeld de groepen in op basis van ambitieniveau. Vanuit studentperspectief werkt dat goed waarbij ook de minder ambitieuzen toch wat extra blijken te worden geprikkeld.

> Als je peerfeedback goed in je cursus integreert, merk je dat de kwaliteit van het schrijfwerk stukken beter wordt. Het gemiddelde cijfer in mijn cursus ging met 0.9 punt omhoog.



PROFIEL
Karlijn Gielen

Departement: Biologie
Niveau studenten: Eerste en tweedejaars Bachelor
Groepsgrootte: groot >120
Gebruikte tool: Peergrade

Hoe heb je de peerfeedback in de cursus vormgegeven?

1. Werkcollege: Ik geef een presentatie over peerfeedback. Waarom we het doen, wat we verwachten en hoe ze feedback moeten geven. Ik deel ook een factsheet uit met wat achtergrondinformatie en met do's en dont's.
2. Online: Studenten moeten een miniscriptie uploaden in Peergrade.
3. Online: Peergrade wijst studenten at random een tweetal miniscripties toe om te beoordelen. Per miniscriptie geven ze peer feedback via het beantwoorden van ongeveer 40 vragen. Deze feedback is anoniem.
4. Werkcollege: In een werkcollege krijgen studenten de tijd om de ontvangen feedback door te nemen en erop te reageren. Dit gebeurt online. Zodat studenten in die tijd direct een anonieme discussie aan kunnen gaan. Aan het eind van het werkcollege stellen ze een "verbeterplan" op, dat bij de docent wordt ingediend.
5. Online: Studenten verwerken de peer feedback in een eindversie (waarbij ze ook ter inspiratie gebruik kunnen maken van een rubric). De eindversie wordt ingeleverd en door de docent beoordeeld.

Wat is je ervaring met het organiseren van de peer feedback?

> Studenten die te laat inleveren is met peer feedback altijd een enorm gedoe. Met Peergrade is dat gemakkelijk op te lossen.

In grote cursussen is het simpelweg niet mogelijk om goede feedback vanuit de docent te geven op allerlei tussenproducten. Daarnaast was het organiseren van peer feedback vroeger een enorm logistiek gedoe. De komst van Peergrade heeft geholpen om een hoop van die logistiek weg te nemen. Hoewel je studenten in Peergrade niet van te voren kan koppelen, kan je er verder wel makkelijk voor zorgen dat iedereen genoeg feedback krijgt. Zelfs als ze het na de deadline indienen. Studenten krijgen bij het geven van peerfeedback namelijk het stuk toegestuurd (anoniem of niet-anoniem) dat op dat moment nog het minste aan anderen is toegewezen. Daarnaast blijf je via Peergrade goed op de hoogte van mensen die te laat inleveren. Dat is vaak een bottleneck in het peerfeedbackproces, maar dat is met deze opzet dus geen probleem.

Wat is je ervaring tussen de feedback online versus de feedback face-to-face?

De online discussie ging goed. Maar je moet er dus wel tijd voor inruimen, zo'n discussie werkt niet goed a-synchroon. Mijn ervaring is dat het alleen goed werkt als alle studenten er tegelijkertijd tijd voor krijgen. In een apart werkcollege werkt dat heel efficiënt

Wat vonden de studenten ervan?

Studenten vonden zowel het geven van peer feedback, als het grondig doornemen van de feedback die ze ontvingen, heel nuttig. Ze vonden het fijn dat het anoniem was. Maar ze merkten wel op dat het hen veel tijd kostte. Toch waren ze uiteindelijk heel blij met alle feedback die ze kregen en dat ze daarmee hun eigen verslag konden verbeteren.

Daarnaast merk je dat ze de procedure van peerfeedback goed geïnternaliseerd hebben, want de studenten die deze wijze van peerfeedback in het 1e en 2e jaar hebben gehad, passen dezelfde regels ook toe in andere vakken die ze later volgen.

Heb je tips voor docenten die peerfeedback willen inzetten?

— Als je een grote cursus hebt, gebruik dan Peergrade om peerfeedback vorm te geven.

Het is makkelijk in gebruik en het scheelt heel veel administratieve rompslomp. Ideaal voor grote groepen.

— Jong geleerd, oud gedaan: Als je studenten in het eerste jaar goede uitleg geeft, heb je daar de hele opleiding profijt van.
— Vertel studenten dat zij de doelgroep zijn van de miniscriptie : als ze bij het geven van peer feedback iets in die miniscriptie niet snappen, is dat niet "dom". Het is waardevolle feedback voor de schrijver als je aangeeft dat je iets niet snapt.
— In mijn cursussen krijgen studenten peer feedback van 2 medestudenten. De kwaliteit van de feedback kan uiteenlopen. Ik benadruk altijd dat je, ook bij lovende feedback, kritisch moet blijven en moet nagaan of bepaalde onderdelen in je miniscriptie wellicht beter kunnen.

PROFIEL

Laurens Dam

Departement: Talen, Literatuur en Communicatie
Niveau studenten: Master
Groepsgrootte: klein <20
Gebruikte tool: FeedbackFruits

Hoe heb je de peerfeedback in de cursus vormgegeven?

Onze studenten moeten een journalistieke opdracht schrijven (over schrijverschap in economische context) in de stijl van *De Correspondent*. De peerfeedback in de cursus verloopt langs een soort ketting van online en *live* elementen.
Online: Eerst lezen ze twee stukken van *De Correspondent*, ter voorbereiding van een college.
Werkcollege: Studenten analyseren in dat college hoe de stukken worden opgebouwd en ontdekken genrekenmerken die ze zelf kunnen gebruiken in hun eigen artikel. De docenten zijn hier moderator. Aan het eind stellen de studenten een lijst opmet kenmerken en aandachtspunten die ze zelf kunnen gebruiken voor hun schrijven. Daarna delen we de handout over goed peerfeedback geven uit en leggen we het proces uit.
Online: Studenten schrijven vervolgens hun eerste praktijkgerichte onderzoeksplan en worden binnen Feedbackfruits in groepjes van 4 ingedeeld. In die groepjes geven studenten elkaar peerfeedback op basis van de eerder opgestelde aandachtspunten (de genrekenmerken). Met die aandachtspunten voorkom je dat de feedback op het niveau van 'komma's en punten' blijft steken. Alle overkoepelende feedbackopmerkingen worden met de hele groep gedeeld.
Online: Ook tweede versie werd voorzien van online peerfeedback.
Werkcollege: Daarna besteden we een werkcollege aan de gegeven peerfeedback, waarin studenten discussiëren en wij als docenten rondlopen. Dat zijn hele leuke werkcolleges met veel spontane discussies met vragen als: 'Waarom heb je dit juist op deze manier aangepakt?' of 'Spreekt je stuk wel voldoende aan als je zo opent?'

Wat is je ervaring met het organiseren van de peer feedback?

Feedbackfruits gebruikt een feed zoals Facebook. We merken dat de studenten niet te veel op die algemene *feed* moeten posten, want studenten worden moedeloos van het bijhouden van alle informatie die daarop staat. Je moet dus duidelijk aangeven wat je teruggeeft in kleine groepjes en wat je doorpost naar de hele groep.

Wat is je ervaring tussen de feedback online versus de feedback face-to-face?

Het is goed om te realiseren dat online feedback een heel andere functie vervult dan face-to-face-feedback. Online kun je goed kijken naar elkaars werk, zeker als het om de eerste kleine opmerkingen gaat. Maar ons werk als docent bestaat er daarnaast uit studenten te leren over tekst te discussiëren. En die discussie online voeren op hoog niveau, is haast niet mogelijk. Dat collectieve proces werkt niet via het scherm, maar daar moet je fysiek voor gaan zitten. In ons geval doen we dat face-to-face tijdens een werkcollege.

Wat vonden de studenten ervan?

— Van studenten krijgen we terug dat ze, via de peer feedback, meer nadenken over het schrijven van het onderzoeksplan.
— Studenten gaan veel bewuster om met het schrijfproces. Ook de door henzelf opgestelde aandachtspunten helpen daarbij.
— De laatste keer dat we deze werkvorm inzetten, kregen we van studenten terug dat er te veel tussentijdse deadlines waren. Hoewel het steeds om kleine opdrachten ging (zoals: discussieer over de gegeven feedback), kwam dat toch te hard als een opgelegde tijdsindeling over. Door zo'n taak een deadline te geven, wordt de discussie een 'product' dat studenten moeten opleveren en niet deel van het proces. Daarom hebben we die druk er in een later jaar afgehaald.

Ons vak bestaat uit tekstdiscussie. Die discussie online op hoog niveau voeren is haast niet mogelijk. Dat collectieve proces werkt niet via tekst, daar moet je fysiek voor bij elkaar gaan zitten.

Heb je tips voor docenten die peerfeedback willen inzetten?

— Als je peerfeedback belangrijk maakt, heb je als docent ook een 'morele plicht' om jouw eigen docentfeedback systematischer aan te pakken: ook jij moet dan de rubric gebruiken die de studenten hebben gebruikt. Houd dat in je achterhoofd.
— Hoewel de studenten goede discussies hebben gevoerd en hun stukken duidelijk gegroeid zijn door dit proces, raken studenten niet echt overtuigd van het dieper leren. Wellicht heeft dat ook met de praktijkgerichtheid van deze specifieke opdracht te maken Men is wel erg blij met de opmerkingen op het eigen stuk, maar het is moeilijk om de studenten in te laten zien dat zij ook feedback geven om ervan te leren.
— Deze opzet maakt wel dat studenten echt gaan herschrijven: tussentijds komt er'een enorme bak aan feedback over hen heen. Aan het eind van de rit hebben ze veel beter geleerd over hoe te schrijven, hoe te structureren en hoe je je stuk op een lezerspubliek kunt afstemmen.

6 PART A. Tools for peer feedback; a comparative Table

Educate-it - versie september 2019

Wat in alle (peer)feedbacktool van Educate-it mogelijk is:

— Zowel individuele als groepsopdrachten inleveren en van feedback voorzien
— Niet-anoniem (peer) feedback geven
— (Peer) feedback geven met eigen rubrics of beoordelingscriteria
— Feedback geven door docent

Verschillen tussen de tools zijn in onderstaande tabel te vinden.

GESCHIKT VOOR:	BLACKBOARD PEER ASSESSMENT	PITCH-2PEER	PEERGRADE	FEEDBACK-FRUITS 2.0: PEER REVIEW
Korte schrijfopdrachten: essays, blogs etc. (max ca. 3000 woorden)	Ja, in BB zelf of als bijlage	Ultrakort (blog)	Ja	Ja
Langere schrijfopdrachten: papers, scriptie etc. (ca. 3000- 10.000 woorden)	Ja, in BB zelf of als bijlage	Nee	Ja	Ja
Video-opdrachten	Ja (embedded of als bijlage)	Ja	Ja	Ja
Powerpoint presentaties	Ja (embedded linkje of als bijlage)	Ja (als pdf)	Ja (als pdf)	Ja
Audio, embedded content	Ja (embedded of als bijlage)	Ja	Ja	Ja
Anoniem pfb geven	Ja	Ja (afh. van opdr)	Ja	Ja
Inleverende student anoniem	Ja	Ja	Ja	Nee
Feedback in de vorm van annotaties bij de tekst	Nee	Nee	Nee	Ja
Cijfer beoordeling door peers	Ja	Nee	Ja	Ja
Cijfer beoordeling door docent	Ja, docent stuurt cijfer naar Gradecenter en kan in het Gradecenter het cijfer aanpassen.	Ja	Is niet mogelijk (wel met work-around)	Nee
Student kan reageren op ontvangen feedback	Nee	Nee	Ja	Ja
Directe koppeling met BB	Ja (het is BB)	Ja	Nee	Ja
Gebruikersgemak	+/- Met nakijken is het lastig beoordelen. De embedded video wordt in een te klein vak weergegeven, je moet scrollen om de hele video te kunnen zien. Daarnaast is het vak om geschreven content te lezen ook niet prettig omdat je maar zo weinig kan zien. Door zaken als bijlage te laten inleveren omzeil je bovenstaande beperking.	+	+	+
Hoeveelheid In te stellen variabelen: bv multiple pitch, categorieën, only submission, koppeling peers	+/-	+	++	-

Zie **https://educate-it.uu.nl/toolwijzer/** voor aanvullende informatie over de tools.

6. PART B. Sets of guiding questions for writing assignments used in Peergrade

In this part, two sets of questions are provided which were used to guide students through the different texts on which they provide feedback to a fellow student during their undergraduate years (in Biology).

1. Peer feedback on a minireview based on 7 statements (in Dutch)
2. Set of questions used in a level 2 course (literature review) or for the Bachelor thesis (in English)

The first set with 7 statements can be used to get students focused on general characteristics of a paper on which they need to provide peer feedback. The other set was used to guide students in more detail through a paper or thesis they need to provide peer feedback on.

1. Peer feedback on a minireview, based on 7 statements (in Dutch)

Werkwijze: Voor iedere miniscriptie die je gaat beoordelen, gebruik je 7 stellingen. Per stelling geef je zowel een oordeel, als een toelichting. Ben je het er volledig mee eens dan geef je een 5. Ben je het er helemaal niet mee eens dan geef je een 0 of een 1. Ben je het er gedeeltelijk mee eens dan geef je een 2, 3 of 4. Van belang is dat je ook je oordeel toelicht in het tekstblok, waarbij je de auteur advies kan geven om iets in de tekst te verbeteren. Je kunt ook een compliment geven als je het tekstonderdeel helder en duidelijk vindt.

1. De titel is duidelijk, aantrekkelijk en dekt de lading.

2. Inleiding bevat de volgende 3 belangrijke onderdelen:
   a. Het onderwerp wordt geplaatst binnen een bredere context
   b. De relevantie van het onderwerp wordt uitgelegd
   c. Definities van belangrijke concepten worden gegeven

3. Aan het eind van de inleiding wordt de hoofdvraag duidelijk geformuleerd en worden deelvragen in een outline goed weergegeven

4. In de Conclusie wordt de hoofdvraag duidelijk beantwoord

5. De structuur van de miniscriptie is overzichtelijk ingedeeld in logisch elkaar opvolgende paragrafen die met inzichtelijke kopjes worden aangeduid

6. De illustraties zijn relevant en ondersteunen de tekst

7. De miniscriptie leest plezierig en het onderwerp wordt goed uitgelegd.

2. Literature review or Bachelor thesis (in English)

S1. Abstract

Explanation: Read the review first before starting the peer-feedback

Q1. Scale – Requires additional comment
Is the content of the Abstract clear?
- ☐ Couldn't find the Abstract
- ☐ Absolutely not clear
- ☐ Partly clear
- ☐ Clear
- ☐ Very clear

Q2. Text.
Is any information in the Abstract missing? (such as: main question, method, most important findings, conclusion). Please indicate, if necessary.

S2. Introduction: content and clarity

Explanation: The introduction describes the context and relevance of the topic. The goal or main question of the review should be clearly stated. An outline of what the reader can expect is provided at the end of the Introduction.

Q3. Text
What is according to you the main question of the review?

Q4. Scale. Requires additional comment.
Is the content of the Introduction explained in a way that is easy understandable?
- ☐ Not at all
- ☐ Hardly
- ☐ Reasonably
- ☐ Yes

Q5. Yes/No. Requires additional comment
Is the structure of the review (short outline of paragraphs) indicated at the end of the introduction?
- ☐ No
- ☐ Yes

Q6. Text.
Is there any type of information still missing in the Introduction? Is here any aspect that should be further clarified? Please explain.

Q7. Text.
Is there any unnecessary information in the Introduction? If so, what type of information and why is it relevant?

S3. Main body: content and coherency

Explanation: Each section describes a relevant aspect of the topic and should have a sub-question, some results and possibly a partial conclusion and/or short summary. A section can be one or several paragraphs.

Q8. Yes/No. Requires additional comment. Are the titles (and subtitles) representative for the content of each section? Do they cover the content?
- ◻ No
- ◻ Yes

Q9. Scale.
Is the content of the various paragraphs described in an understandable way?
- ◻ Not at all
- ◻ Poorly, not every paragraph
- ◻ Reasonably
- ◻ Yes

Q10. Text
If not, describe for a specific paragraph(s) what is still unclear.

Q11. Scale. Requires additional comment
Is there (part of) a conclusion at the end of each section?
- ◻ No
- ◻ Yes, only occasionally
- ◻ Yes

Q12. Text.
Are the **connections** between the different sections and paragraphs clear and fluent? Give an example where it is unclear

Q13. Scale
Is the **sequence** of paragraphs logical?
- ◻ No
- ◻ Yes, some do
- ◻ Yes

Q14. Text.
Is the information provided (including the described experiments) relevant for the main question? Explain, if necessary.

Q15. Scale
Is there an over-reliance on one or two sources per section (each section may consist of one or more paragraphs)?
- ◻ No
- ◻ Yes, some do
- ◻ Yes

Q16. Text.
Is there any irrelevant information in the main body? If so, what type of information and why is it irrelevant?

Q17. Scale.
In-depth information is provided in the various sections.
- ◻ No, nowhere in the text
- ◻ Yes, in some sections
- ◻ Yes, in many parts

S4. Discussion and Conclusion

Explanation: The Discussion deals with possible conflicting data, ideas and/or arguments which were found in the literature in relation to the main question. You may like to discuss which arguments are most convincing (possibly using a table to provide a clear overview). The Conclusion answers the main question clearly and concisely.

Q18. Text.
What is the main conclusion of the review?

Q19. Yes/No. Requires additional comment. Is this conclusion a clear and concise answer to the main question?
- ◻ No
- ◻ Yes

Q20. Scale.
Is the conclusion supported by the described experiments and by the provided arguments?
- ◻ No, not at all
- ◻ Yes, partly
- ◻ Yes

Q21. Scale.
Is the content of the Discussion clear?
- ◻ No, not at all
- ◻ Hard to understand
- ◻ Reasonably clear
- ◻ Yes

Q22. Text.
Is there any information missing in the Discussion?

Q23. Scale.
Indicate the nature of the Discussion. Explain, If necessary.
- ◻ The Discussion is absent or is only a summary of what has been presented.
- ◻ The Discussion contains a concise summary as well as a discussion of arguments.
- ◻ An in-depth discussion of arguments related to the main question is combined with a clear vision of the author on the topic.

Q24. Yes/No. Requires additional comment. Are there any counter arguments or alternative explanations discussed for the conclusion?
- ◻ No
- ◻ Yes

Q25. Scale
Are there any suggestions given for follow-up research?
- ◻ No
- ◻ Partly, but doesn't seem very relevant or it is rather obvious.
- ◻ Partly, but not very logical in relation to the content or main question.
- ◻ Yes, interesting and logical suggestions are given.

Q26. Text.
Is there any unnecessary information in the Discussion? If so, please indicate.

S5. Illustrations, References and Bibliography

Explanation: Illustrations should support the main text. A legend explains what is seen in the figure, but should not contain a conclusion.

Q27. Text.
Are the illustrations/ figures relevant?(do they support the facts and arguments in the text?). Clarify, if necessary.

Q28. Scale.
Are the figures of good quality: is everything visible and readable?
- ◻ No.
- ◻ Only some
- ◻ Yes, most are
- ◻ Yes

Q29. Text.
Are the different parts of the illustrations explained in the legend? In case they are not, please indicate which part of the figure or illustration. Is a source indicated in the legend?

Q30. Scale
Are all the figures referred to in the main text?
- ◻ No
- ◻ Not all the figures
- ◻ Yes

Q31. Text
Are the references **in the text** correctly cited? If necessary, indicate what should be improved.

Q32. Text
Are the references **in the Bibliography** correctly presented (uniform style)? If necessary, indicate what should be improved.

S6. Writing style

Explanation: Indicate to what extent you agree with each of the following statements.

Q33. Scale.
The text is written in a fluent & coherent way and reads easily.
- ◻ Fully disagree
- ◻ Disagree
- ◻ Neutral
- ◻ Agree
- ◻ Fully agree

Q34. Scale.
The text is written in correct English (or correct Dutch).
- ◻ Fully disagree
- ◻ Disagree
- ◻ Neutral
- ◻ Agree
- ◻ Fully agree

Q35. Scale.
Difficult or unfamiliar scientific terms are explained well.
- ◻ Fully disagree
- ◻ Disagree
- ◻ Neutral
- ◻ Agree
- ◻ Fully agree

Q36. Scale.
The text is full of vague terms, jargon and unclear passages.
- ◻ Fully agree
- ◻ Agree
- ◻ Neutral
- ◻ Disagree
- ◻ Fully disagree

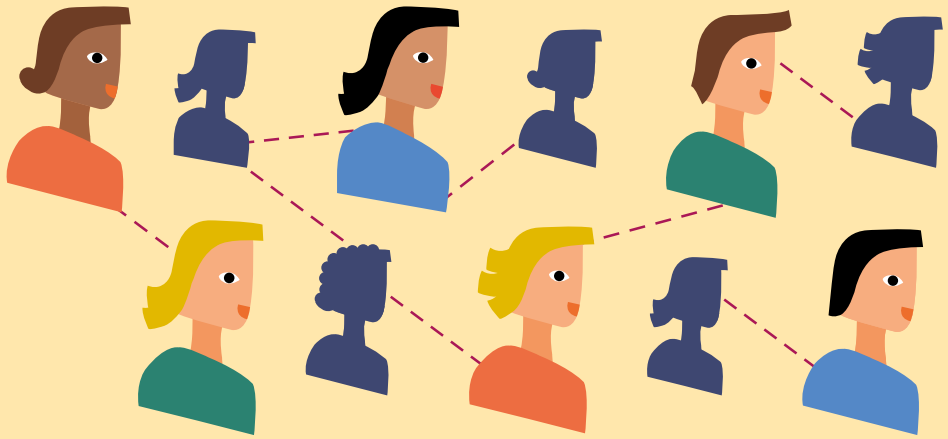
S7. Overall

Explanation: -

Q37. Scale.
Is there a clear overall structure in this review? Do the various parts form a coherent whole?
- ◻ Unclear structure. There is no connection between the different alineas and paragraphs. Pieces of text seem to have found a random location and some are irrelevant for the main question.
- ◻ The structure is still a bit vague. The paper consists of parts that are relevant but remain somewhat fragmented, not always with a clear connection to the main question.
- ◻ The paper is rather structured. The different parts are quite well connected to each other. Once in a while there is a piece of text or (sub)topic that seems somewhat unrelated to the topic and/or main question.
- ◻ The Review is well structured. The different parts are well connected, also in relation to the main question.

Q38. Text.
Which compliment(s) would you like to give for this paper?

Q39. Text.
Describe two main aspects which should be improved in this paper.



7

EXPERIMENT 1

The effect of dialogic peer feedback on deep learning in campus-based education

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(Article submitted)

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Introduction

Providing and discussing peer feedback is considered to be a useful strategy to encourage deep learning in students. Peer feedback, when used in online education, has recently been shown to stimulate critical thinking, to help integrate new knowledge with what you already know and to facilitate the making of new connections. All these are considered to be important elements of deep learning.

The present study focused on the following research questions:

1. What is the effect of online dialogic peer feedback on perceived deep learning in campus-based education?
2. To what extent do the variables course level, learning channel (online, face-to-face or blended), and anonymity influence deep learning?

Methods

Participants: In total, 816 students were involved from 10 courses, given in the Faculty of Humanities, the University College Utrecht and the Faculty of Sciences.
Course level: Course coordinators who planned to use online peer feedback in their courses were asked to be included in this study. The courses were given on four different levels, including the Bachelor (course level 1, 2 or 3) and Master program (level 4). In these courses, the peer feedback cycle consisted of providing, receiving & discussing peer feedback on a written assignment. Students were asked to fill in a questionnaire during class hours after completion of the peer feedback cycle. Of the 816 students, 545 filled in a questionnaire (66.8% response rate). Of the 545 students included, 525 were bachelor students and 20 were master students.
Learning Channel: In the 10 individual courses the learning channel varied from a fully online dialogue, a face-to-face dialogue, or blended dialogue (which consisted of online interactions, followed by face-to-face interactions between students). In total, 209 students performed the dialogical peer feedback cycle completely online, 150 performed the dialogue face-to-face, whilst 186 students underwent a blended form of peer feedback.
Anonymity: The course coordinator decided whether the dialogic peer feedback was performed anonymously or non-anonymously within their course. In 366 students, the peer feedback cycle was anonymous, whereas in 179 students, the peer feedback cycle was non-anonymous.
Measuring Deep Learning: In order to map the student's perceptions with respect to the extent in which deep learning has been achieved, a questionnaire was used with the operationalization of the items concerning: critical thinking, integrating new information with prior existing knowledge and making new connections. Students were asked to what extent a deep approach to learning was achieved, choosing from a 5-point Likert scale, which included the following answers: strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5).
Procedure: For all participants, the peer feedback cycle was implemented in the course during a regular writing assignment. The peer feedback cycle consisted of the following three steps:

— Step 1 consisted of peer feedback instruction, in which students were told how to provide peer feedback and how to encourage deep learning. Students were also shown examples of the do's (feedback aimed at a deep learning approach) and don'ts (plausible bad or inefficient feedback examples). Thereafter the students were asked to upload their papers in a peer feedback tool such as Peergrade© (7 courses), FeedbackFruits© (1 course) or Blackboard (2 courses).
— In step 2, students were asked to provide feedback to two papers of their peers which were randomly distributed. Peer feedback was often provided with a specific set of questions as a guideline for students to focus on the most important elements of a text. Students provided the feedback online within the set time slots as were provided

within the specific course and the implemented peer feedback tool.
— In Step 3, students were asked to look critically at the feedback they received. Additionally, they were stimulated to react to the feedback and to engage in a discussion.

After these three steps were finalized, the students filled in a single questionnaire regarding the three steps of peer feedback they had: 1. Provided; 2. Received; and 3. Discussed. Finally, the students were able to use the peer feedback to improve their writing assignments before final submission to the course coordinator for assessment and grading. After Step 3, in some of the courses additional focus interviews were conducted for which a number of students were randomly invited.

Results

Q1) What is the effect of online dialogic peer feedback on perceived deep learning in campus-based education?
Overall, the students indicated that the different phases in the peer feedback cycle (i.e., providing, receiving and discussing) lead to perceived deep learning (score above 3 on five-point Likert scale). This is in line with previous observations in online peer feedback.
Both providing and receiving peer feedback stimulated more perceived critical thinking compared to the discussion of peer feedback ($p<0.001$). Perceived deep learning through integrating new knowledge is the highest in the providing phase of peer feedback compared to the other phases, while perceived deep learning through integrating new knowledge is higher during receiving than during the discussion. The same accounts for deep learning through making new connections, which is also the highest in the providing phase, and lower during the receiving and discussion phase.

Q2) To what extent do the variables course level, learning channel, and anonymity influence deep learning in dialogic peer feedback?

Course level: No differences in perceived deep learning were observed between bachelor students and master students. We subdivided this question with respect to the course level, where we could discern bachelor level 1 ($n=198$), level 2 ($n=284$), level 3 ($n=17$) and master students (level 4 ($n=20$)). There were significant differences in perceived deep learning through integration of new knowledge, in which bachelor level 3 students perceived more deep learning as compared to bachelor level 1 ($p=0.023$) and bachelor level 2 students ($p=0.016$). Perceived deep learning regarding making new connections was also significantly higher in bachelor level 3 students compared to bachelor level 1 and level 2 students ($p=0.021$ and 0.003, respectively), as well as in master students compared to bachelor level 2 students ($p=0.044$). No differences were observed with respect to perceived critical thinking. Finally, when deep learning was averaged, perceived deep learning was higher in bachelor level 3 students compared to bachelor level 1 and 2 students.

Learning channel: With respect to the three different learning channels (online, face-to-face, or blended), online discussions resulted in making significantly less new connections compared to face-to-face discussion or the blended discussion ($p=0.027$ and $p=0.007$, respectively). There were no significant differences between the learning channels for critical thinking and the integration of new knowledge. When all deep learning parameters are averaged in one single deep learning outcome, there are also no significant differences between the different learning channels.

Anonymity: We examined whether participating in the different phases of peer feedback (non)anonymously would influence the different outcomes of perceived deep learning.
A difference was observed between anonymous and non-anonymous for deep learning according to integration, which was significantly higher in the non-anonymous group ($p=0.044$). However, for deep learning average, there was no significant difference.

Conclusion

This study demonstrated that all three phases in the peer feedback cycle lead to higher perceived deep learning. Deep learning is perceived most when providing peer feedback. Receiving and discussing peer feedback also resulted in perceived deep learning, but less in comparison with providing peer feedback. The perceived deep learning was higher in bachelor level 3 students compared to bachelor level 1 and 2 students. Learning channel and anonymity had no significant effect on overall perceived deep learning.

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EXPERIMENT 2
In search of an optimal peer feedback strategy to achieve deep learning; Role of anonymity and learning channel.

Karlijn Gielen, Anke van Mil, Rianne Poot, Renée Filius and Fred Wiegant

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Summary of main aim and strategy

Peer feedback is considered to be a useful strategy to achieve deep learning. This study investigated the role of anonymity and of the learning channel (online or face-to-face) in achieving perceived deep learning using dialogic peer feedback.
All students were asked to upload their individual writing assignment (minireview) in Peergrade and subsequently to provide peer feedback on the products of two fellow students who were randomly assigned to them. Students were able to react and discuss the received peer feedback before improving and then submitting the final version of their individual writing assignment for grading by the teacher. The study was conducted with biology students from two different years (200 1st year- and 149 2nd year biology students). To evaluate the role of anonymity students were randomly assigned to one out of two groups in which the peer feedback was provided, received & discussed online either anonymously (n= 94 1st year / n=48 2nd year) or non-anonymously (n=106 1st year / n=101 2nd year). To study the role of the learning channel (online or face-to-face), 101 2nd year students first provided peer feedback online (non-anonymously) and then were randomly assigned to a group in which the peer feedback was received & discussed either online (n=49) or face-to-face (n=52). All students were asked to fill in a questionnaire with open and closed questions on different aspects of deep learning during the providing, receiving and discussion phase of peer feedback.
In addition, students were asked to evaluate the quality of the peer feedback they gave as well as the quality of the peer feedback they received on a scale of 1-10. Approval for this study was obtained by the ethical committee from the Faculty of Science & Geoscience.
All students signed an informed consent form.

Main results & conclusions

1. Providing peer feedback

An important question to ask is whether there is a difference in perceived deep learning when peer feedback is **provided** either anonymously or non-anonymously, both in 1st year and 2nd year students. Based on our results we can conclude that there is no significant difference in perceived deep learning between these groups when feedback is provided anonymously vs non-anonymously. Both groups reported to have experienced perceived deep learning (critical thinking, integration, new relations as well as the overall deep learning score) to the same extent. This is observed both in 1st year students and in 2nd year students. Although students may prefer providing feedback either anonymously or non-anonymously, there is no difference in the effect peer feedback has on perceived deep learning. Therefore, it is up to the teacher or the learning goal in a course to either implement peer feedback (non) anonymously. In general, students indicated to prefer anonymous peer feedback as it allows them to be more critical in expressing their suggestions to improve the text of their peers.

2. Receiving & discussing peer feedback

We also asked the question whether there is a difference in perceived deep learning when peer feedback is **received & discussed** online when provided either anonymously or non-anonymously, both in 1st year and 2nd year students.
Again, based on our results, there is no significant difference in perceived deep learning between these groups when peer feedback is received and discussed anonymously vs non-anonymously. Both groups reported to have experienced perceived deep learning (critical thinking, integration, new relations as well as the overall deep learning score) to the same extent when receiving or discussing peer feedback. This is observed both in 1st year students and in 2nd year students.
It was obvious that **discussing** feedback had the least impact on deep learning whereas **receiving** peer feedback appeared to be slightly more efficient (especially in first year students) to support perceived deep learning in comparison with **providing** peer feedback, although this effect was not significant.
Although students may have indicated in the open questions to prefer receiving & discussing feedback from their peers either anonymously or non-anonymously, there is no difference in the effect peer feedback has on deep learning.

3. Quality of peer feedback provided & received

We asked students to qualify with a grade (1-10) the quality of peer feedback they gave to two of their fellow students (either anonymously or non-anonymously) in comparison with the peer feedback they received from two of their fellow students. For each individual student, the average grade was calculated of the two grades that were either provided for the **feedback given** or the two grades which were provided for the quality of **feedback received**.

- There is no significant difference in the average grade for the quality of **provided peer feedback** when either given anonymously or non-anonymously. This was observed in 1st year students as well as in 2nd year students.
- There is also no significant different in the average grade for the quality of **peer feedback received** when the feedback was received either anonymously or non-anonymously. This was observed both in 1st year students as well as in 2nd year students.
- In addition, we were interested whether the feedback was qualified differently when it

was **given** in comparison with when it was **received**. We asked this since we heard from some students that they were disappointed that they had put a lot of effort in providing detailed feedback but then received somewhat sloppy feedback from one of their (non) anonymous peers. However, we also heard opposite stories that students were very satisfied and even surprised with the high quality of feedback they received. Interestingly, in first year students the quality of the peer feedback which was **received** anonymously (7,61 ± 0,76) was evaluated significantly higher in comparison with the peer feedback they **provided** themselves anonymously (7,38 ± 0,72)(p=0.009). This was even more pronounced in the situation of non-anonymous peer feedback. The peer feedback which was received non-anonymously (7,681 ± 1,09) was evaluated as significantly higher in comparison with the peer feedback they provided non-anonymously (7,29 ± 0,75)(p=0.007).

In second year students, however, there were no significant differences in the quality between the peer feedback which was received (7,29) vs provided (7,25) in case peer feedback was given anonymously. The same was observed with peer feedback received (7,42) vs provided (7,3) in case it was given non-anonymously.

Especially, first year students seemed to be surprised by the high quality of the feedback they received to from their (non)anonymous peers.

4. Differences in deep learning between 1st year and 2nd year students when providing, receiving and discussing feedback (non)anonymously?

We asked the question whether any significant difference could be observed in perceived deep learning between 1st year and 2nd year students when they provide, receive and discuss peer feedback either anonymously or non-anonymously? Possibly an effect of maturity could be relevant.

Providing, receiving and discussing Anonymously

There are no significant differences between 1st year and 2nd year students on perceived deep learning when they **provide or discuss** peer feedback. However, there is a significant difference in perceived deep learning between 1st and 2nd year students when they **receive** peer feedback. Especially the aspect of critical thinking is perceived as more impactful in 1st year students (4.21 ± 0.67) vs 2nd year students (3.75 ± 0.98)(p < 0.001).

Providing, receiving and discussing Non-Anonymously

There are no significant differences between 1st year and 2nd year students on perceived deep learning when they **provide or discuss** peer feedback. However, there is a significant difference in perceived deep learning between 1st and 2nd year students when they **receive** peer feedback. Especially the aspect of critical thinking is perceived as more impactful in 1st year students (4.21 ± 0.78) vs 2nd year students (3.86 ± 0.90)(p = 0.006). In addition, when **providing** peer feedback non-anonymously, 1st year students report a significantly higher level of being able to make new relations (3.70 ± 0.90) in comparison with 2nd year students (3.26 ± 0.77)(p<0.001). Students at the beginning of year 1 appear to learn more from receiving peer feedback in comparison with 2nd year students, whereas 1st year and 2nd year students perceive similar deep learning effects when providing and discussing peer feedback.

5. Role of the learning channel (online vs face-to-face) in 2nd year students:

We asked the question, whether there is a difference in perceived deep learning in 2nd year students when provided peer feedback (non-anonymously and online) is received & discussed either online or face-to-face.

Providing and receiving peer feedback non-anonymously

There are no significant differences in perceived deep learning in students who provide peer feedback non-anonymously which will subsequently be received & discussed either online or face-to-face. The same was observed when 2nd year students who receive peer feedback non-anonymously which will subsequently be discussed either online or face-to-face.

Discussing non-anonymously either online or face-to-face

However, there are significant differences in overall perceived deep learning in the group of 2nd year students who discuss peer feedback non-anonymously either online (2.93 ± 1.02) vs face-to-face (3.50 ± 0.98)(p=0.005). Significant differences in perceived deep learning were reported in the aspects of "critical thinking" (p=0.048), "integration" (p=0.002) and "making new connections" (p=0.012), where face-to-face discussion was reported to be superior to online discussion.

7. Quality of peer feedback when received & discussed either online or face-to-face

In order to determine whether there is a difference in how 2nd year students evaluate the quality of the peer feedback which they received & discussed either online or face-to-face, we asked them to qualify with a grade (on a scale of 1-10) the quality of peer feedback they gave to two of their fellow students (non-anonymously) in comparison with the peer feedback they received & discussed from two of their fellow students.

In second year students, no significant differences were observed in the quality of the peer feedback which was received & discussed either online or face-to-face. Although, no differences were observed in the quality of peer feedback, they did report more perceived deep learning when peer feedback was received & discussed face-to-face vs online, as was explained in the previous paragraph.

Analysis of open questions in questionnaire.

In the questionnaire, students were asked to respond to some open questions. For each open question we mention some (five?) representative answers/statements.

What is the most important aspect you have learned from providing peer feedback?

- "You learn to read a text more critically and you are more rigorous in comparison with your own text, because you want to help a fellow student in the best possible way".
- "I had to read the text critically in order to understand both structure and content. In this way, I was actively involved in the work of somebody else which was very positive later on for improving my own text".
- "By critically evaluating the text of others, you also learn to be more critical on your own texts, which helped me to reflect on how to improve it".
- "I enjoyed reading the text of others, because you can see how others solved certain

issues and it helped me to decide on the best strategy to apply in my own text".
— "It helped me to evaluate my own text more critically later on and to improve on logical structure, consistency and argumentation".

What is the most important aspect you have learned from receiving peer feedback?

— "I appreciate to read what others think about my text; it makes me more aware of aspects I need to improve because it can be clear for me but not for them".
— "The feedback I received forced me to reconsider some aspects and helped to improve the text. Without this feedback, I thought it was all OK and didn't want to pay much more attention to it".
— "The aspects which were mentioned in the feedback would never have occurred to me. In this way you also pay more attention to these aspects in future texts".
— "It is valuable to evaluate the feedback critically and decide whether you want to use it yes or no. Sometimes feedback from peers on a specific aspect of the text can be both positive and negative. Therefore, it is important to think critically and not accept any advice blindly".
— "The feedback I received was much more valuable than receiving a grade from your teacher, because you learn more specifically how to improve things for the future".

What is the most important aspect you have learned from discussing peer feedback?

— "The best tips I received during the discussion! These were not mentioned in the feedback I received".
— "There was not really a discussion, but somehow it helped to reflect on whether you agree with the feedback received".
— "Online discussion wasn't a big success, one of my peers didn't respond to my questions".
— "I don't think it was a very useful addition. Just reflecting on the feedback received is worthwhile enough".
— "As far as I am concerned, this aspect can be skipped".

Is there anything else you want to share with respect to the peer feedback assignment?

There were quite a number of remarks with respect to following three issues:
— whether the peer feedback was either anonymous or non-anonymous
— whether discussion was either online or face-to-face.
— remarks related to expert feedback and to shortcomings in the program.

Below the remarks on these issues are mentioned:

Anonymous or non-anonymous peer feedback.

Most remarks indicated a preference for anonymous peer feedback.
— "I don't like the feedback to be anonymous. I prefer to know from who it comes".
— "I would have preferred to provide anonymous feedback; it makes it easier to be more critical".
— "I like the feedback to be anonymous, although I miss the quick interaction of a personal discussion".
— "I prefer to provide anonymous feedback. I think I can be more honest when my name is not mentioned ".
— "I think it is better to have anonymous feedback rather than knowing from who it comes".

Discussion online or face-to-face:

Most remarks indicated a preference for discussion face-to-face rather than online.
— "I prefer online, because you think a bit more before responding. If I respond quickly it often sounds more unfriendly".
— "To bring across a message correctly online is more complicated than in real life".
— "I enjoyed face-to-face, because explaining issues in a discussion is much easier than doing it online. In addition, it is helpful to ask for clarifications on the feedback they provided".
— "I enjoyed and appreciated to have discussed the feedback in real life, because people are then much less inclined to be short and breve in their answers".
— "Reacting on received feedback and then receiving a response on your questions doesn't really work in Peergrade. I prefer a real life discussion".

Additional remarks

— "I still do not have a clue, what is right or what is wrong in the remarks of my peers".
— "I still do not know what to do, lacking the opinion of an expert. It would be nice if the teacher would also provide feedback on the minireview".
— "Would be nice if it is possible (optionally) to provide feedback to more minireviews than just two".
— "Maybe an improvement: Would be nice if I could tell the students who gave me feedback how much I appreciate their comments and suggestions and indicate what helped me most in improving my text".
— "Would be nice to be able to ask a specific question (in addition to the standard questions in Peergrade) you want your peers to focus on when providing feedback".

8 Learning Progression in Peer Feedback?

Peer feedback is considered to be a useful strategy to encourage deep learning and to reduce the involvement of students in surface learning.
In the dichotomy of learning approaches, *surface level learning* has a more negative connotation and is repeatedly shown to lead to poorer outcomes when it comes to understanding of concepts and retention thereof. It is usually applied when learning is considered a nuisance and only necessary to pass an exam after which most of the acquired knowledge dissipates. Students engaging in surface level learning often have little motivation to explore the topic in more width or depth and expect the teacher to provide the content which is important and necessary to learn. On a more positive not, surface learning can be useful to memorize facts and it is sometimes considered to be a prerequisite to reach a deep learning approach.
Deep learning refers to a process in which the learner recognizes the dynamic and interrelated structure of the subject under study and actively engages with it. It involves critical thinking, making new connections between different concepts and is marked by constant active integration of new information with old ideas (Gordon & Debus, 2002).

Since deep learning is a crucial aim in University education, it is of relevance to identify strategies aimed at stimulating deep learning. Since peer feedback is known to stimulate deep learning, a learning progression on providing and receiving & discussing peer feedback as academic skill might be in line with this aim. Here we reflect on challenges in developing a learning progression focused exclusively on peer feedback, with the aim to encourage deep learning.

Peer feedback is usually implemented in courses when students are allowed to improve the quality of a specific type of assignment before the final version will be handed in which will subsequently be qualified by the teacher. Most frequently, a writing assignment is used on which students can provide feedback to their peers. Depending on the complexity of the writing assignment and whether the essay, (mini)review, research report or proposal is written in the Undergraduate or Graduate program, the type of peer feedback is usually adjusted to what students should focus on. In this respect, one could imagine a learning progression in which the peer feedback that needs to be provided becomes increasingly complex during the Undergraduate program. During the early phase of the Undergraduate or Bachelor program, the main focus could then be to provide feedback on questions like: is the introduction well structured?, is the main question well formulated and is it located at the end of the introduction?, is the sequence of paragraphs logical?, is the content and coherence of the different paragraphs OK?, is the (mini)review as a whole well structured?, is the main question mentioned in the introduction appropriately answered in the conclusion? In later years, peer feedback could be focused on more advanced aspects of the skill of academic writing such as ability to describe complex issues in an accessible way, solidity of the argumentation, consistency of elements in the discussion, etc. All the above mentioned aspects of providing peer feedback is however not specifically related to providing, receiving & discussing feedback as an academic skill. In these examples, feedback is mainly focused on encouraging reflection on the skill of academic writing.

> "Peer feedback is not only a useful tool to stimulate deep learning, it is also an efficient tool to intensify reflection on academic skills in learning progressions"

In a more general context, peer feedback can also be used in relation to a wide variety of other type of assignments in which specific academic skills are being practiced, such as: argumentation, presenting skills, cooperation within teams, or any other 21st century skill.

Although the focus of the feedback being provided can be very different (from the level of complexity of a specific academic skill), the manner in which feedback is being provided is often similar in style which usually requires some training in how feedback is provided, received and discussed. In our project we developed factsheets to provide some background information on how to provide peer feedback and to raise awareness on how to receive peer feedback. This training is however quite generic and can hardly be qualified as part of a learning progression.

The actual learning progression often relates to the type of academic skill on which peer feedback is being provided, such as academic writing, presenting, argumentation, cooperating, etc. The peer feedback being provided, but also the feedback being received from peers, usually generates critical thinking and reflection on how to perform the specific skill in the most optimal way. In this sense peer feedback may stimulate reflection on how to improve for instance academic writing, presentation skills, argumentative reasoning or working

as a valuable member within a team. Peer feedback could thus be used as a tool to intensify a learning progression of a specific academic skill. To design a learning progression on peer feedback as such (which was our initial goal), would turn this educational tool upside down. Academic skills such as writing, cooperation and presentation should not be used in service of learning to provide, receive or discuss peer feedback. On the contrary, peer feedback should best be used to intensify student experiences in learning progressions of the 21st century skill mentioned above.

In our project we mainly focused on peer feedback being provided, received & discussed in relation to a writing assignment. Often a set of guiding questions were used by students to provide peer feedback. These guiding questions were adapted to the course level and to the phase of the learning progression in which the academic writing skill which was mostly practiced. In this sense the complexity of the writing assignment or the complexity of the argumentative reasoning or type of presentation guides the focus of peer feedback. In our experience, peer feedback is thus not only a useful tool to stimulate deep learning, it is also an efficient tool to intensify reflection on academic skills in learning progressions.

Conclusion

On second thoughts, a learning progression aimed at developing peer feedback as an academic skill is not realistic. The act of providing feedback can indeed be trained and can become more complex during the undergraduate and graduate program, but it is only relevant when feedback is focused on academic skills such as: writing an academic text (such as a literature review or essay, a research report), argumentative abilities, ability to cooperate in groups, ability to present, to design a video clip including a short pitch, etc. When providing feedback, existing rubrics can be used as guidelines. For most of the above mentioned academic skills rubrics are available. The value of peer feedback is mainly to intensify student reflection on how to perform a specific skill in the most optimal way. Training of providing and receiving peer feedback is advisable to guarantee and optimal way in which the peer feedback process will take place.

9 Sequential Peer Feedback encourages deep learning in Honours Education during the process of writing chapters for a popular science book.

Introduction

In most courses peer feedback is implemented only once. Students provide feedback to their peers and the feedback which is received is then used to improve their writing assignment before it will be graded by the teacher. This strategy has been shown to encourage deep learning both in online courses as well as in campus-based higher education.
Much less experience has been obtained when peer feedback is implemented sequentially, aimed to gradually improve a writing assignment until an end product is reached.
In our honours program at the Department of Biology (Utrecht University), sequential peer feedback (up to 4 rounds of feedback within a time frame of 8 weeks) has already been used for a number of years. During this program, a cohort of students are actively engaged in writing a popular science book. This authentic activity, which is completely student-led, takes place during an academic year. Students choose a topic for the book, decide on chapter topics, write the actual content, provide peer feedback to different versions of the chapters, are involved in drawing illustrations and designing the front cover, they contact a publisher, and they present their book at a symposium where parents, fellow students and experts are invited. In order to achieve all this, they divide tasks in terms of editorial board, an editor in chief who also is responsible for all deadlines, a committee which organizes the honours course,

illustrators, symposium organizers, etc. More details can be found elsewhere (Wiegant et al. 2012; Scager et al. 2016, 2020; Peeters and Wiegant, 2019).

Structuring sequential peer feedback

In order to have a general guideline how to structure the type and focus of peer feedback which should be provided on each subsequent version of the chapter during the writing process, we asked advice from the honours students of a previous cohort. The previous cohort already had ample experience with providing peer feedback while writing a popular science book. In individual reflections, they responded to the following question: What is in their experience the best way to structure the focus of sequential feedback which is given to improve the various elements of the book chapter in the most optimal way? Which phases can be discerned? They generally agreed that the following sequence in the focus of providing peer feedback is most efficient:

- Phase 1: Introduction, Main question, Overall structure and Logical sequence of paragraphs
- Phase 2: Content & sequence of elements in the introduction, Content of the various paragraphs, Internal consistency of each paragraph, Internal consistency of the chapter as a whole, Argumentation, Is the main question well answered?, Is there a clear connection of the chapter with the other chapters of the subtopic or theme?, Is a connection clarified of the chapter with the overall topic of the book?
- Phase 3: Overall consistency & fluency of the text, Grammar, Style, Are the references well presented (APA?).

In general, the 10 honours students in this study followed the above mentioned suggestions from a previous cohort in their peer feedback sessions while writing their book chapters.

Organization of the writing process and of peer feedback

Halfway the academic year, a 10-week honours course is scheduled in which the actual writing of the book chapters takes place. Chapters are usually written by individual students but students may also decide to write a chapter with a fellow student. Deadlines for submission and peer feedback are usually scheduled rather strict in such a way that submission of draft versions of the chapter as well as providing peer feedback took place on a biweekly basis. The feedback which was received and discussed each time was then used to improve the draft version of the chapter before a next version of the chapter was submitted for peer feedback. Each chapter will receive peer feedback by two students. Providing peer feedback was organized in such a way that one student was committed to provide feedback to the same chapter in a sequential way, thereby experiencing improvements made during the different writing phases. Usually this was somebody from the editorial board. The other student who provided peer feedback was each time a different individual and thus read the chapter for the first time. This combination of providing and receiving feedback from individuals who were either familiar with the text and or saw the text for the first time appeared to function very well. Early in the writing process, the editors-in-chief provided peer feedback in which they mainly focused on the coherence of all chapters within the various themes of the book and/or in relation to the main message. They encouraged the authors of individual chapters to align their content with other chapters in order to exclude overlap but also to emphasize synergy in strengthening the overall message of the book. A final feedback took place when each student send their individual chapter to an academic expert on the topic who often had minor suggestions for improvement.

Evaluation of the effect of peer feedback on deep learning

Since peer feedback is considered to be a useful strategy to encourage deep learning, we asked the students at the end of the honours course (when all book chapters were send to the publisher), to fill in a questionnaire with open and closed questions to evaluate their experience during the peer feedback process. In order to map the student's perceptions with respect to the extent in which deep learning has been achieved, the closed questions in the questionnaire focused on aspects of deep learning, concerning: critical thinking, integrating new information with prior existing knowledge and making new connections. Students were asked to what extent a deep approach to learning was achieved, choosing from a 5-point Likert scale, which included the following answers: strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5). The open questions asked them to reflect on what they learned from providing, receiving and discussing peer feedback and in what way their peer feedback differed on the first version in comparison with later versions.

With respect to question whether peer feedback helped to achieve deep learning, table 1 clearly shows that both providing and receiving peer feedback stimulated perceived deep learning. Critical thinking was especially triggered when peer feedback was received. The overall impression of the discussion phase seemed to be less useful in encouraging deep learning in comparison with the providing and receiving phase of peer feedback. With respect to the discussion phase, however, it was clear that there appeared to be two groups. One group of honours students were very enthusiastic about the discussion phase indicating a high level of deep learning, whereas the other half didn't experience the discussion as very valuable at all with respect to deep learning.

Table 1: Different aspects of deep learning triggered by the various phases of peer feedback

	PROVIDING	RECEIVING	DISCUSSING
Peer feedback helped to:			
think critically	4,1	4,5	3,5
integrate new information	3,8	4,0	3,5
make new connections	4,1	3,9	3,3
Overall deep learning	4,0	4,1	3,4

In addition, a number of open questions were asked to which the following answers were given. For each of the open questions below, some representative answers are shown.

What is the most important thing you have learned from providing peer-feedback?

- That it really takes time and effort to provide feedback that has good quality.
- To be critical & objective in a constructive way. Not only indicate what I think is good or bad, but also why I think so. And then to provide suggestions for improvement.
- It helped me to recognize mistakes and things which I could improve in my own chapter. When reading other chapters I often saw imperfections which were also present in my own chapter. These imperfections are often hard to recognize when you read your own

chapter for the tenth time but when seeing them in other chapters, recognizing and improving these imperfections in my own chapter became easier.

— Providing feedback has learned me to think critically about a piece of text. It is not always easy to do it in a constructive & positive way which is also to-the-point. In addition, it has challenged me to be creative and think of ideas that would add something to the text. It is also inspiring for your own text, since it makes you think in a critical but also out-of-the-box way, which improved my own work in the end.
— How to formulate feedback in a clear and constructive manner. But also, that there is such a thing as 'too much' feedback, since people might then lose confidence in themselves or do not clearly see what is most important to work on.

What is the most important thing you have learned from the peer-feedback you received?

— To bring things straight to the point and focus especially on the core subject which needs clarification and emphasis. I tend to include too much information which blurred a bit the main message.
— Something which is clear to me, is apparently not always clear to others.
— Thanks to the feedback I received I gained more insight into how I look at things, how other people look at them and how this may differ. So it gave me more knowledge on what the "general public" would interpret when they read my chapter. In this way I was able to adjust the text more towards my audience.
— To not be stubborn in sticking to your own ideas, but be open to new ideas, which in the end improved my chapter.
— Receiving feedback is a great way of measuring your progress. It also keeps you sharp to hear your reviewer's opinion on the information and reading experience. It is especially useful for the content of your text, since two know more than one!

What is the most important thing you have learned from discussing & processing peer-feedback?

— While discussing you kind of get the intentions of the feedback. Sometimes feedback can be interpreted very differently than was originally intended. Discussing feedback can then be very useful and insightful. Therefore, the discussion may provide some context to at least figure out how to go from there. That's why I really liked the discussion sessions.
— To deal with feedback in an efficient and smart way. Sometimes receiving criticism for something you have worked really hard for can be difficult, but in combination with giving feedback to others these things become easier.
— Discussion did not really help, the feedback I received was clear enough.
— Discussing the feedback was really useful, since it can be hard to put your feedback on paper clearly. It taught me to make feedback and writing something together really interactive and see that we can truly learn a lot from one another.
— The tone in which feedback is provided is crucial. The most important thing I have gained from discussing & processing peer feedback is "insight". Insight in the topic, the progress of the other person but also in your own learning process. It makes you more aware of your strong points but also your own shortcomings. There is always room for improvement. Providing, receiving & discussing feedback is an interesting way to get more insights in possibilities and perspectives on many levels of the text, such as the level of sentences, structure, message and relevance.

Did the peer-feedback method (as a whole) stimulate you to actively process information about the topic of your written assignment? Please explain why or why not?

— Yes, it did. As I am writing a text, I mainly write on what I find interesting and tend to have a tunnel vision. It is good to hear other people's opinions to be more open about the subject at hand.
— Yes it did. It made me rethink storylines I had written as it came off as too vague or too subjective. For me it didn't look that way initially, but when looking through the eyes of somebody else and reading their thought process you understand why it might not be the best way to describe the topic.
— Yes. Every time I received feedback, I went through every comment to really see which parts could use some improvement. Seeing these parts can become difficult after going through your own chapter over and over again.
— Yes, because when there is somebody else who reads your text, but not your sources of information, they might not entirely understand, which makes it important to actually process the information and create an output that is clear for the audience.
— Yes, peer feedback stimulated me to actively process information about my topic. It was very interesting to get suggestions and ideas from reviewers. They make you look at your own work from a different angle. Suggestions to add pieces of information to the content were the most helpful in order to bring the chapter to a new level. Also tips & tops on structure make you look critically to your own work.

In what way was the peer-feedback that you gave on the first version of a book chapter different in comparison with the feedback you gave on the (pre)-final version of the book chapter? Please explain shortly.

— The first feedback tends to be more general. Like 'maybe it is interesting to look into this'. The pre-final version was more specific in which I focused more on the details, like 'maybe formulate this differently'.
— In the first version I focused more on the content and the structure of the story, did the sequence of topics in the story make sense?, it is interesting to read?, etc.. While for the later version I looked at small details like style, grammar and choice of words.
— The first version is about the global content of the chapter. It's more about what topics do you want to focus on and what information are you going to use. The feedback on the pre-final version is more about the smaller details; language errors, small inconsistencies, vague phrasing. Although it does depend a little on the chapter you are reviewing, some might be already quite far in their progress and some not..
— The first feedback was on the general structure of the chapter, topics discussed and the order in which they were discussed. For the later versions I would narrow the feedback down to the structure of separate paragraphs and even sentences. In the last version you focus on grammar and spelling. Since the sentences will change a lot in earlier versions, this type of feedback would then not be necessary yet.
— The peer feedback I gave on the first version was mainly on content & structure, whereas the feedback I gave on the pre-final version was meant to improve the text and make it more understandable for the reader.

Please give a short description of the preferred "environment or setting" while discussing the peer-feedback.

- I prefer providing feedback anonymously. In this way I tend to be more honest.
- I am not really a fan of discussing peer feedback. I prefer to elaborate alone on the feedback received.
- I enjoyed face-to-face peer feedback because you could discuss it in real time and also ask further details about the feedback you were given. We discussed for instance why a certain approach would or wouldn't work. It's nice to do it during a scheduled event. People are then less likely to call it off or to just discuss it via chat.
- The manner in which the peer-feedback was organized by our course-committee was very useful and efficient. It was not too much (nor too less) feedback. By always giving feedback to one specific person but also to a different person in every round of peer feedback, made that the received feedback had very specific points (provided by the one who followed the progress in your chapter) but also more general points (given by a fellow student who read your chapter for the first time).
- For me, discussing feedback works best face-to-face. However, I then also need the received feedback on paper in front of me, because only then you can discuss the specifics which are needed to start working on the next version.
- For me, the atmosphere in which I enjoy discussing peer feedback can be described by two words: "safe and respectful". With a "safe" environment I mean that I should feel free to speak up and express my opinion. In return, I am happy to listen to input from others. "Respectful" means that tips and tops should be given in a constructive manner and respectful way. Taking the other person seriously and being taken seriously is what it is all about.

Conclusion

Overall, during the writing process of this group of honours students, sequential peer feedback was experienced as useful in improving the content and quality of the chapters of the popular science book they were writing. In general, they reported that sequential peer feedback stimulated both critical thinking as well as creative out-of-the box thinking.
From the questionnaire, it can be concluded that both providing and receiving feedback encouraged deep learning during the writing process. Discussing peer feedback did not stimulate deep learning to the same degree, although the group of students reported mixed opinions in this respect. Half of the students were very positive about discussing peer feedback and indicated that it stimulated deep learning and that it helped them to substantially improve their chapter, whereas the other half thought it did not add much to perceived deep learning.
The answers to the open question provided an interesting insight in the variety of aspects students appreciated and did learn from the sequential peer feedback process.

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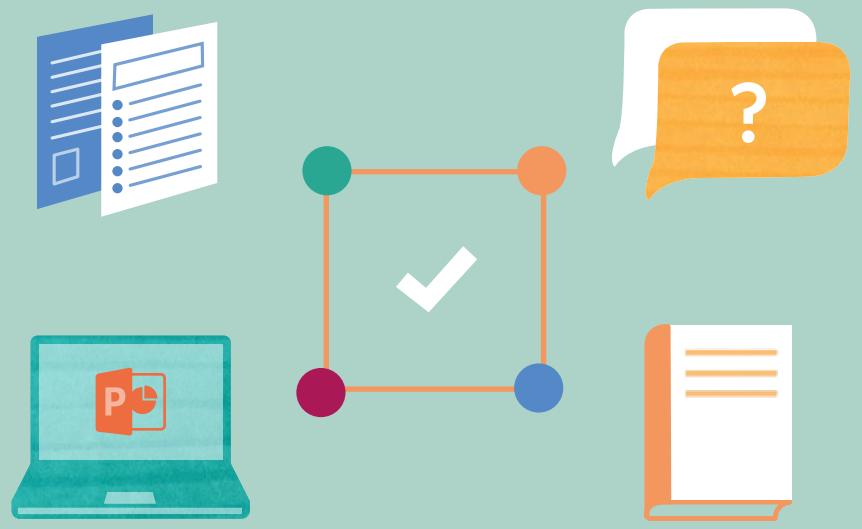
Figure 1: The group of honours students (plus two supervisors) and the popular science book they wrote. For more details on all previous popular science books written by the honours program at the Department of Biology, Utrecht University, check the pdf which can be downloaded from the site of the publisher (Uitgeverij de Graaff).
www.uitgeverijdegraaff.nl/boeken-van-uitgeverij-de-graaff/biologie
www.uitgeverijdegraaff.nl/fondslijst



10 Appendices

A. Questionnaire om het effect van geven, ontvangen en bediscussiëren van peer feedback op diep leren na te gaan met gesloten en open vragen.

B. Set vragen voor focus interviews met groepen studenten om hun ervaringen te inventariseren en zicht te krijgen op achterliggende mechanismen van diep leren.

C. Samenvatting van het proefschrift van Renée Filius (2019): "Peer feedback to promote deep learning in online education; Unraveling the process".
Dit proefschrift stond aan de basis van het SURF/USO project waarover u in dit rapport heeft kunnen lezen.

D. Workshop over peer feedback & diep leren op het Herfstfestival van de Faculteit Betawetenschappen; powerpoint slides (november 2019)

APPENDIX A
Peer-feedback Questionnaire used in our studies

One of the assignments in the course was a writing assignment in which you had to give feedback to your peers and also received feedback in order to improve you work. The peer-feedback method that was used is new, and we would like to determine if this new method is better able to support your learning. To this end, we would like to ask you to fill out this questionnaire which is composed of three subthemes; the feedback you *provide* to peers, the feedback you *received* from peers and the *reflection* about this peer-feedback.

The letters in the questionnaires refer to the following categories:

SD — strongly disagree
D — disagree
N — neutral
A — agree
SA — strongly agree

Do not spend a long time on each item: your first reaction is probably the best one. Do not worry about projecting a good image. Your answers are CONFIDENTIAL. Thank you for your cooperation.

1. The peer-feedback that I ***provided***, helped me to:	**SD**	**D**	**N**	**A**	**SA**
.. think critically about the subject matter					
.. integrate new information with what I already knew					
.. make new connections between different pieces of information and concepts					
.. feel personally committed to my peers					
.. understand how to better ask or provide relevant feedback in the future					
.. be involved in a dialogue with my peers					
.. understand my own learning process					

2. The written (peer) feedback that I ***received***:	**SD**	**D**	**N**	**A**	**SA**
.. was useful					
.. helped me to think critically about the subject matter					
.. helped me to integrate new information with what I already knew					
.. helped me to make new connections between different pieces of information and concepts					
.. helped me to feel personally committed to my peers					
.. helped me to understand how to better ask or provide relevant feedback in the future					
.. helped me to be involved in a dialogue with my peers					
.. helped me to understand my own learning process					

3. **Discussing** the feedback received with my peers:	**SD**	**D**	**N**	**A**	**SA**
.. was useful					
.. helped me to think critically about the subject matter					
.. helped me to integrate new information with what I already knew					
.. helped me to make new connections between different pieces of information and concepts					
.. helped me to feel personally committed to my peers					
.. helped me to understand how to better ask or provide relevant feedback in the future					
.. helped me to be involved in a dialogue with my peers					
.. helped me to understand my own learning process					

4. What is the most important thing you have learned from providing peer-feedback?

5. What is the most important thing you have learned from the written peer-feedback you received?

6. Did you have a discussion with the students who provided the feedback after reading their comments?

- ☐ Yes, this was an obligatory part of the assignment
- ☐ Yes, I choose to discuss the feedback with peers (for example, because I did not fully understand their comments)
- ☐ No, I did not discuss the feedback with the students providing these comments. (You may skip the next question and go to question 8)

7. What is the most important thing you have learned from discussing peer-feedback?

8. What is the most important thing you have learned from *processing* peer-feedback?

9. Did the peer-feedback method (as a whole) stimulate you to actively process information about the topic of your written assignment? Please explain why or why not?

10. Is there anything else you would like to share regarding peer-feedback in the assignment?

APPENDIX B
FOCUS interviews met groepen studenten

In experiment 1 werden een studenten gevraagd deel te nemen aan een van de focus interviews waarbij onderstaande vragen werden voorgelegd:

Vragen voor semigestructureerde focusinterviews:

Kan een van jullie kort toelichten hoe de peerfeedback opdracht er uit zag?
— Welke stappen in peerfeedback cyclus heb je doorlopen
— en hoe (online of face-to-face)?

Wat is je mening over de inzet van peerfeedback in het algemeen?
(Vind je peerfeedback een prettige manier van leren?) Houd je van PFB?
Werkt deze manier van PFB voor jou?

Welke meerwaarde voor peerfeedback heb je ervaren?
— Aan welk onderdeel uit de peerfeedbackcyclus zou je dit effect (het meest) toeschrijven?

Welke digitale tool hebben jullie gebruikt om peerfeedback te geven?
— Wat was er prettig aan deze tool en wat werkte minder goed?

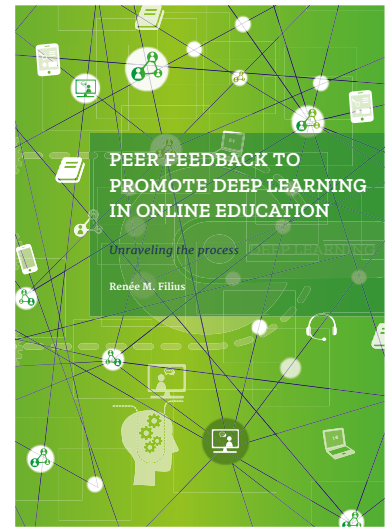
Welke meerwaarde van peerfeedback had je verwacht, maar niet ervaren?

Wanneer geen dialoog in cyclus:
— Zou het bespreken van de feedback met de feedbackgever het resultaat kunnen verbeteren/ helpen bij het leren?

Wanneer wel dialoog:
— Welke verschillen verwacht/ ervaar je bij het bespreken van feedback in de tool, face-to-face, anders? Wat werkt het beste en waarom?

APPENDIX C
Summary PhD of thesis by Renée Filius (2019)

“Peer feedback to promote deep learning in online education; Unraveling the process”



Universities aim for deep learning. Deep learning involves critical thinking, integrating what the student learns with what he or she already knows, and making new connections between different concepts. It is a learning approach that can be visualized as a continuum, with “surface learning” on the opposite side, which concerns memorization, mainly aimed at passing a test.

Two trends may threaten the achievement of deep learning: the massification of student numbers and the increase in online education by universities. Taking these trends into account, this dissertation examines the extent to which instructors can promote deep learning in online higher education. The main research question is as follows: How can instructors promote learning in online higher education? In answering this question, we use the “CIMO logic” as a frame of reference; we look at the context, intervention, mechanisms, and result. This offers the opportunity to describe exactly in which context which intervention, triggered by which mechanisms, leads to which result.

As interaction is regarded as a precondition for achieving deep learning, Chapter 1 examines the amount of interaction in online education and, specifically, in “Small Private Online Courses” (SPOCs). To this end, we analyzed the various interactions between students and between students and instructors within four courses. We distinguish among “social,” “functional/technical,” and “content specific.” We then conclude that there is a great deal of interaction in online education, almost half of which consists of social interaction. The types of interaction we found are comparable to the categorization used by Ké and Xie (2009). They distinguish among social, knowledge, and regulation. Students usually start the conversation; only 10% of the conversations are initiated by the instructor. Based on the large amount of interaction, we conclude that online higher education can be a suitable environment for students to learn deeply.

In Chapter 2, we looked for the challenges instructors face when trying to promote deep learning in online education. We interviewed 11 instructors with experience teaching in SPOCs, with a wide spread in terms of geographical location, age, and experience. Based on these interviews, we identified five challenges: 1) alignment in learning activities, 2) insight into students’ needs, 3) adaptivity in teaching strategy, 4) social cohesion, and 5) creating dialogue. These results indicate that SPOCs have distinctive challenges compared to other

forms of online education. If the results are viewed from the perspective of the "Community of Inquiry" of Garrison and Kanuka (2004), it can be seen that instructors in SPOCs pay sufficient attention to cognitive presence when aiming for deep learning, but they could place more emphasis on social and, especially, teaching presence. Instructors can take these results into account when developing and teaching within SPOCs. Consequently, it shows the need for training in how to design and teach SPOCs.

In order to meet the challenges mentioned above, in Chapter 3 we identify a wide range of scalable feedback interventions, including mechanisms that trigger a deep learning approach. Scalable feedback interventions are described in three categories: feedback management, peer feedback types, and automatic feedback. The mechanisms identified were "feeling personally committed," "asking and receiving relevant feedback," "understanding one's own learning process," and "probing back and forth." The results show a deepening of the "online learning interaction model" of Ké and Xie (2009), which focuses on deep learning. Their three categories can be expanded with the mechanisms found in this study, which will further enrich the model. Moreover, the results of this study show that the quality of the interaction is more important than the quality of the feedback itself. We indicate that in order to make full use of feedback, students must be actively involved in feedback as a dialogue. Therefore, our last two studies, in chapters 4 and 5, focus on the implementation of dialogic peer feedback.

Chapter 4 describes the use of asynchronous online typed peer feedback. We focused on deep learning by improving the feedback dialogue as a scalable intervention. Students provided peer feedback in the form of a dialogue, both individually and in a group. They were instructed to provide feedback aiming for deep learning. They were also asked to rate each other's feedback.
The data from questionnaires, completed by 41 students of a course of the master epidemiology, were used to measure for each feedback assignment to what extent deep learning was experienced. The feedback from students who scored extremely high or low on the questionnaire was analyzed to find out which features lead to deep learning. In addition, students were interviewed to retrieve information about the underlying mechanisms.
Our results support the view that instruction on providing peer feedback aiming for deep learning, combined with assessment of the peer feedback received, leads to peer feedback dialogues, which, in turn, promote deep learning in SPOCs. The value of peer feedback appears to derive primarily from the dialogue that is initiated, rather than from the feedback itself. The value of peer feedback appears to predominantly result from the dialogue it triggers, rather than the feedback itself. Especially helpful for students is the constant attention to how one provides peer feedback: by instruction, by having to rate feedback, and therefore by repeatedly having to reflect. This study then shows the added value of feedback from peers compared to that of instructors. Because students question feedback from peers more than feedback from their instructor, they continue to think longer and deeper, which promotes deep learning. It also appears that when the peer feedback refers to a theoretical source, such as a scientific article, this results in surface learning. Results suggest that the student does not quickly question the theoretical source and therefore does not think long or hard about it, which results in surface learning.

Chapter 5 discusses asynchronous online audio peer feedback. Students made an assignment that they presented via an audio recording. Then they gave oral feedback on the presentation of at least one randomized peer, who responded to it. Afterwards, 108 students filled in questionnaires, and 14 students were interviewed. This was used to measure the extent to which deep learning was experienced and why. All participating students followed an online course, of which 68% participated in a massive online course (MOOC) and 32% in a SPOC. Results show that, just like typed feedback in online education, providing audio peer feedback in online education leads to deep learning. Van Popta et al. (2017) showed that providing online typed peer feedback leads to deep learning. We add to this finding that this also applies to audio peer feedback and that the extent to which this happens is comparable to receiving peer feedback. The following student mechanisms were triggered: "feeling personally committed," "probing back and forth," and "understanding one's own learning process." Particularly important for both providing and receiving feedback is feeling personally committed. The results also show that the student mechanisms were a stronger predictor of deep learning when providing feedback than when receiving feedback. We suggest that audio peer feedback makes great demands on feeling personally committed and, as a consequence, both feedback providers and feedback receivers learn deeply.

In Chapter 6, the main research question — How can instructors promote deep learning in online higher education? — is answered on the basis of the conclusions of the chapters. Each individual chapter presented an empirical study that contributed to the answer. A summary of the conclusions of these studies is described below.
Interaction is important for promoting deep learning. In this dissertation, we show how, despite the fact that interaction in online education is often asynchronous and written, deep learning can be achieved. Subsequently, various recommendations for follow up research are given, based on the CIMO logic. For example, deep learning could be measured differently. Moreover, other ways could be sought to trigger the mechanisms, and more specifically "feeling personally committed." Subsequent research can then be conducted into the scalability of the interventions and into the right balance between small-scale and large-scale learning methods. Research into the possibility of having a virtual assistant with artificial intelligence to carry out some of the tasks of the instructor can also be interesting. Furthermore, this research primarily focuses on the role of the instructor, but future research may also focus on the role of the student.
The landscape of higher education has evolved so rapidly and profoundly over the last 15 years, with the emergence of mass and online education, that the education strategy needs to be reconsidered. Students are increasing in number, but also in types and needs, as more students will combine their studies with other responsibilities, such as work or family life. Thus, as the differences between students widen, the current distinction between students in initial education and in pre- and post-initial education may become smaller. Universities are faced with the task of serving this large number of diverse students with often less funding per student.

This dissertation shows that online education enables universities to continue to focus on deep learning. This is important, as this is their core task and distinguishes them from many other education providers. Online education also contributes to more flexibility in learning pace, preference, location, and time, as well as to more modular education. That is why universities need to invest in their online education strategy and implementation.

The following consequences for the future of higher education are therefore described: a) reallocate the tasks of the instructor; b) shift from delivery to design; c) pursue diversity in student groups and through multidisciplinary education; d) utilize and expand lessons learned in MOOCs on scalability and lessons learned in SPOCs on social cohesion; e) monitor and join the developments on the deployment of artificial intelligence assistants; and f) keep supporting and professionalizing instructors and e-moderators. We advise universities to encourage instructors to develop their own education and to conduct continuous research into it. In this way, we want to help not only instructors, but also (future) academics to be inspired and reach their full potential. Ultimately, we want to enable them to contribute to solving all kinds of social issues that require deep learning and, therefore, deeper understanding.

Link to thesis

www.media-and-education.nl/publicaties/didactiek/proefschrift-peer-feedback-promote-deep-learning-online-education-unraveling

APPENDIX D

Workshop over peer feedback & diep leren op het Herfstfestival van de Faculteit Betawetenschappen; powerpoint-slides (november 2019)

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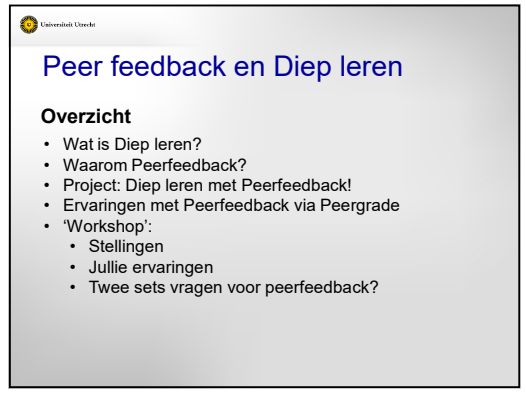

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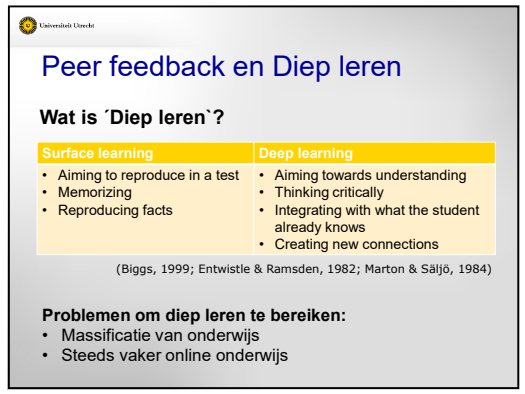

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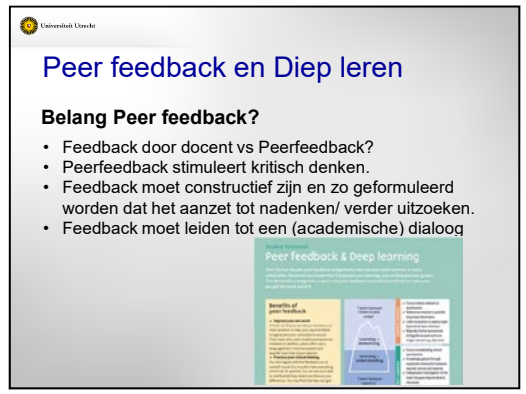

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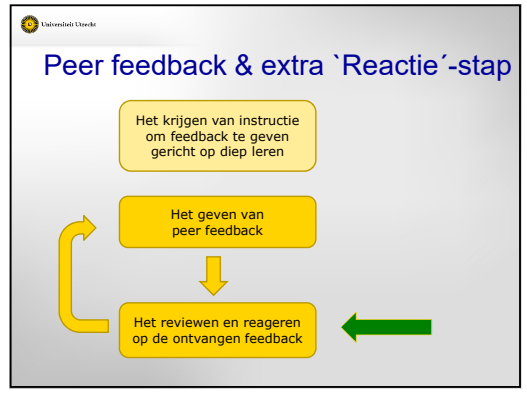

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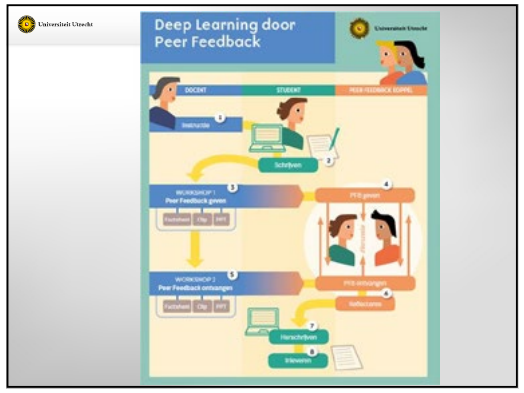
APPENDIX D

Workshop over peer feedback & diep leren op het Herfstfestival van de Faculteit Betawetenschappen; powerpoint-slides (november 2019)



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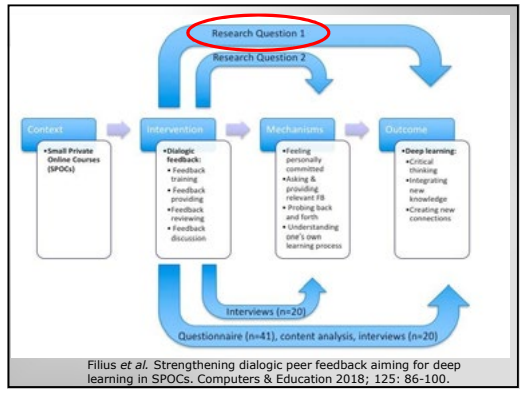


Filius *et al.* Strengthening dialogic peer feedback aiming for deep learning in SPOCs. Computers & Education 2018; 125: 86-100.

8

Peer feedback en Diep leren

Onderzoeksvraag

- In hoeverre leidt het uitbreiden van peerfeedback met een reactie door de ontvanger, tot ´diep leren´?

Eerste resultaten (Filius *et al.* 2018)

- Studenten ervaren diep leren voor wat betreft kritisch denken (94%), leggen van verbindingen (90%), en creëren van nieuwe concepten (86%).
- Omdat de ontvanger moet reageren, wordt de ontvangen feedback zorgvuldiger en kritischer gelezen. Het stimuleert reflectie.

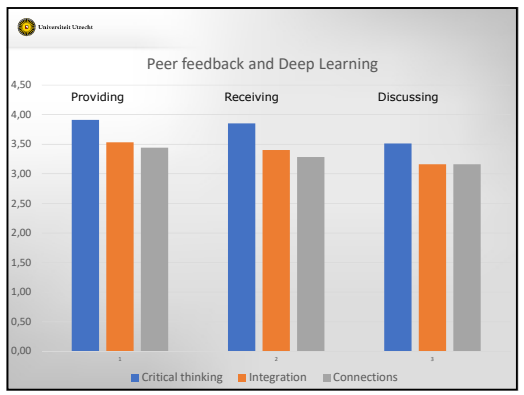
9

Peer feedback en Diep leren

USO-project

- 10 cursussen
- 545 enquêtes (499 bachelor, 46 master)
  - 366 anoniem; 179 niet-anoniem
  - Niveau 1 (198), 2 (284), 3 (17), Master (20).
- Feedback
  - Face-to-face (124); Online (209); Beide (212)

10



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Peer feedback en Diep leren

Verdere analyse's

Is het resultaat afhankelijk van:

- het niveau (1, 2, 3, Master)
- de wijze waarop (anoniem vs niet-anoniem)
- de wijze van reactie (online vs face-to-face vs blended)
- Etc.

12

Peer feedback en Diep leren

Overzicht

- Wat is Diep leren?
- Waarom Peer feedback?
- Project: Diep leren met Peer feedback!
- Ervaringen met Peerfeedback via Peergrade
- 'Workshop':
  - Stellingen
  - Jullie ervaringen
  - Twee sets vragen voor peer feedback?

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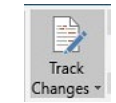
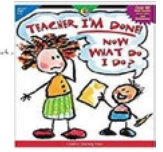
Risico's Peer feedback?



Peer-edit

"Alles was goed"

Kantlijn kriebels



Al klaar na 10 min

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Waar moet goede peer feedback aan voldoen?

- **Constructief** (uitleggen waarom je iets vindt, voorbeelden noemen, verbetertips)
- Specifiek/helder
- Kritisch
- Vriendelijke toon
- Subjectief ('ik' vorm)

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Peer feedback

- Studenten vaak te lief
- Verlegen/zelf onzeker → niet kritisch op anderen

- Anoniem peer feedback
- Cijfer geven voor peerfeedback

16

Peer feedback

- Aansluiten bij beoordelingscriteria
- Niet alleen taal en inhoud → ook overkoepelend: structuur en samenhang

- Gerichte vragen stellen

17

Online (anoniem) peer feedbackproces

1. Instructies peer feedback
2. Studenten geven feedback (zelfstudietijd)
3. Tijdens werkcollege:
   a) Feedback open zetten
   b) Feedback lezen, liken en flaggen
   c) Online vragen stellen ter verduidelijking
   d) Reflectie: Komt feedback overeen? Waar is de meeste feedback op gegeven? Ben je het eens met de feedback?
   e) Verbeterpuntenplan maken

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APPENDIX D

Workshop over peer feedback & diep leren op het Herfstfestival van de Faculteit Betawetenschappen; powerpoint-slides (november 2019)

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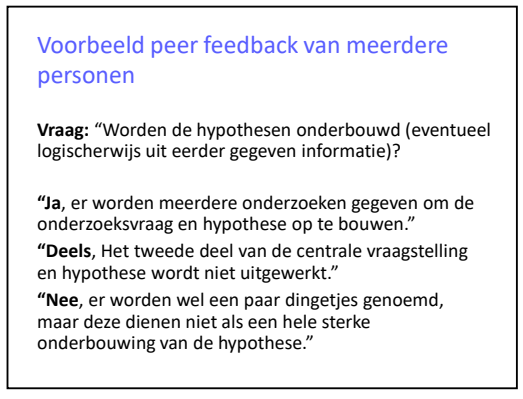

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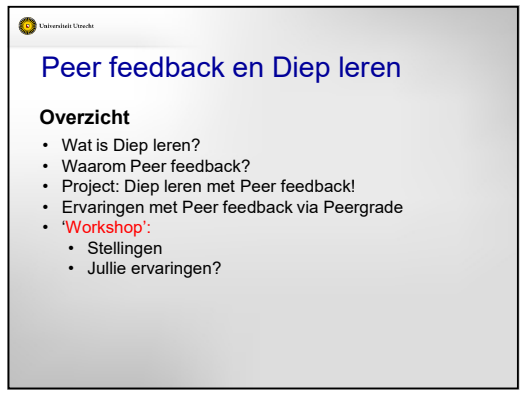

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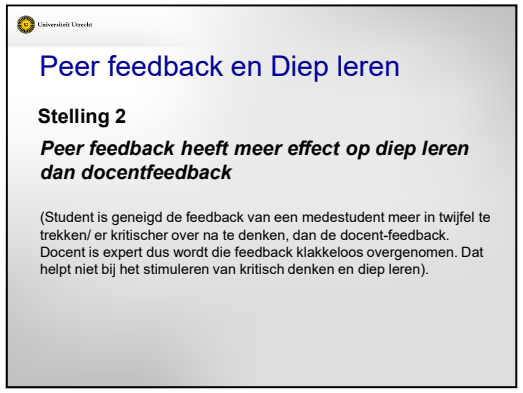

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One of the core tasks of universities is to enable deep learning in their students. Only when students are encouraged to adopt deep approaches to learning, high quality learning outcomes, such as analytical, conceptual & critical thinking skills can be achieved. This manual, being the result of a combined SURF- and USO-project, is focused on *dialogic peer feedback as one of the efficient strategies to stimulate deep learning*.

In this manual you will find;

- an overview of the latest literature on deep learning and peer feedback *(Chapter 2)*
- a tested method for implementing dialogic peer feedback into your courses *(Chapter 3)*
- two workshops for your students on giving peer feedback and receiving peer feedback *(Chapter 4)*
- good practices with peer feedback from three different university teachers *(Chapter 5)*.
- online tools to implement dialogic peer feedback *(Chapter 6)*.
- results of our experiments on the effect of the peer feedback method on deep learning *(Chapter 7)*
- … and many more useful insights!

We hope you enjoy this teacher manual and find inspiration in the various sources we have provided. In case you decide to implement peer feedback in your courses, we are sure that your students will not only appreciate the process of providing, receiving and discussing peer feedback, but also benefit from it in terms of deep learning.

Universiteit Utrecht

SURF