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AN EMBEDDED INTERVENTION TO SUPPORT THE DEVELOPMENT OF STUDENT FEEDBACK LITERACY

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ABSTRACT

Feedback literacy is an emerging concept. It is seen as an individual competency that facilitates taking an active role in contemporary feedback processes. As such, it is a valuable skill not only in the classroom, but also in students' future professional lives. This paper reports on a qualitative study of a learning intervention embedded in a lab series, aimed at developing first-year engineering students' feedback literacy. The intervention consists of a short e-learning module, a one-hour workshop, and two peer feedback assignments. The design of this interventional study is based on the comparison of an experimental group with a control group. Both groups participated in focus group discussions after the intervention (n=55). Findings were complemented by data from reflection logs collected at the end of the semester describing students' most important feedback experience (n=42). The results suggest that the learning intervention contributed to the understanding of the key concepts and principles of feedback literacy. Moreover, students in the intervention group appear to value their peers better and recognise their valuable contribution in the feedback process. Although students realise that easily applicable feedback, such as minor corrections, make a limited contribution to their learning, they still often prefer it because of the minimal time effort required. Based on the findings, the paper concludes with recommendations for both individual courses and entire programmes, such as encouraging reflection, and supporting students in storing and revisiting feedback.

1 INTRODUCTION

Over the past decade, there has been a shift in the way feedback is perceived in education. Scholars reoriented the transmission-focused view on feedback towards a learning-focused view in which students play an active role (Henderson et al. 2019; Winstone and Carless 2019; Boud and Molloy 2013; Molloy, Boud, and Henderson 2020). Feedback is thereby seen through the lens of social constructivism as a partnership between teachers, students, and peers (Thurlings et al. 2013; Winstone and Carless 2019). Engineering education also recognises this, and students must increasingly take charge and responsibility for their own learning (Diefes-Dux 2019; Jaeger and Adair 2018; Wallin and Adawi 2018). To take on the active role in the feedback processes, students need requisite skills and capacities, which has been termed 'student feedback literacy' (Sutton 2012; Carless and Boud 2018; Nieminen and Carless 2022). In their seminal paper, Carless and Boud (2018) defined student feedback literacy as "the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies" (2018, 1316). It therefore refers to the ability of students to understand and use feedback effectively in order to improve their learning. Since students' capacities partially depend on how teachers create their learning environments, the term 'teacher feedback literacy' was also defined in a similar way as "the knowledge, expertise and dispositions to design feedback processes in ways which enable student uptake of feedback and seed the development of student feedback literacy" (Carless and Winstone 2020, 4). Discussion of exemplars and engaging in peer feedback are proposed as two well-known learning activities that can be re-focused more explicitly towards developing student feedback literacy (Carless and Boud 2018). Purposeful selection and well-aligned discussions of exemplars put teachers in the lead of highlighting key aspects of quality work by clarifying the reasoning, while showing that quality is manifested in various ways (Sadler 1989; To and Carless 2016). Next, engaging in peer feedback is often more beneficial than only receiving feedback, as it involves developing evaluative judgement, both about the work of peers as about own work, which can eventually reduce the need for external feedback (Nicol, Thomson, and Breslin 2014). Therefore, this paper reports on a study in which a learning intervention containing analysis of exemplars and peer feedback was embedded in a technical lab. The aim of the intervention was to support the development of student feedback literacy. Based on reflection logs and focus group discussions, the effect of the intervention and students' general attitudes towards feedback are discussed.

2 METHODOLOGY

2.1 Participants

All freshmen from the 2022-2023 academic year of the Faculty of Engineering Technology (KU Leuven) at De Nayer Campus were considered in this study (n=66). Two lab groups (n=28) were assigned as intervention groups, while the other three lab groups (n=38) remained as control groups. A reference group was also included in the

study, comprising of 67 freshmen who were enrolled in the academic year 2021-2022 in the same programme at the same campus.

2.2 Context

All freshmen involved in this study were enrolled in an integrated module. During the first weeks of the semester, professional competences are taught in full-group lectures in the auditorium. During the rest of the semester, these competences are practised in an integrated way in technical lab sessions with smaller groups. In the first semester, the focus of professional competences is on HSE (health, safety, and environment), professional communication, academic writing skills, information skills, critical reflection, and feedback literacy. As part of the topic on academic writing, the rubric that will be used to assess students' academic writing skills was explained and good and bad examples were discussed.

The lab topic that is used to test the learning intervention consists of two three-hour lab sessions, complemented with a mandatory preparation through an online prelab module, and report writing after each session. The reports must be submitted per team and are therefore a responsibility of the entire team. At the beginning of the first session, the rubric for assessing students' academic writing was briefly reviewed with students of the reference groups (academic year 2021-2022) and control groups (academic year 2022-2023). Students in the intervention groups (academic year 2022-2023) practiced the rubric more thoroughly on an exemplar, as will be described later in this paper. In academic year 2021-2022, a combination of teacher feedback and peer feedback was used with students in the reference groups. In academic year 2022-2023, the control groups received only teacher feedback, while the students in the intervention groups only engaged in peer feedback, as discussed in the section about the learning intervention.

2.3 The learning intervention

The intervention consisted of 3 main elements: (1) a short e-learning module, (2) a one-hour workshop, and (3) two peer feedback assignments, one after each lab session. Firstly, the e-learning module introduced students to the key concepts and principles of feedback literacy, including its definition by Carless and Boud (2018). As part of the module, a knowledge clip was used to highlight similarities between the technical topic of the lab and feedback processes. Secondly, a workshop was organised at the beginning of the first lab session, and students were divided in teams for the remainder of the lab topic. They discussed several introductory questions within their team, such as "What is feedback?", "What is the function of feedback?", "What effect does feedback have?" and "Where and from whom does feedback come?". After the team discussions, the questions were discussed amongst the full lab group to develop a shared definition of feedback and to link it to the feedback literacy definition by Carless and Boud (2018, 1316). To continue the group discussion on feedback literacy and bring in different angles, PollEverywhere was used so that students could anonymously "score" the feedback literacy level of ten authentic student quotes by clicking emoticons on the standard PollEv 'emotion scale'. The quotes were carefully

selected from earlier collected student data. Some exemplary quotes include: (1) "*I used to think that feedback was a tool for teachers to indicate whether you are doing well or not, but actually I have come to realise that it is so much more than just a few sentences about what you are doing. I started doing more with feedback, both feedback at school level, and feedback in my personal environment. Thinking more often and longer about the feedback I get and really thinking about it. I did that much less before.*", which was selected to demonstrate a change in the student mindset and to expand the view of feedback as being limited to an educational setting; (2) "*When I receive feedback, I put it on a list. Then, when I make or revise an assignment, I keep this list alongside me and check whether I have taken into account all these aspects I have done wrong in the past. This way, I know that I am already less likely to make mistakes in this area.*", which was selected to stress the active role of the student in organising feedback so that it can be reused in the future and to discuss options on how to do so; and (3) "*About two weeks back, we received our first feedback on the report. I must admit that at first sight I was unpleasantly surprised. On reflection, I noticed that the feedback were all thoughtful and correct comments. Consequently, I felt obliged to correct these errors.*", which was selected to bring in the emotional aspect and to emphasise that it is fine to put feedback aside when it comes in hard, but that it is necessary to pick it up again afterwards for feedback to be effective. Next, the rubric for assessing academic writing was reviewed, and students practiced it using an exemplar report of the same lab topic that was specifically crafted to contain both good and bad examples. Afterwards, the strengths and weaknesses of the exemplar were discussed within the lab group. Finally, the students were instructed about the further timing of the lab series and the practicalities of the peer feedback assignment.

2.4 Data collection

At the end of the semester, two separate methods of data collection were used: (1) students wrote a reflection log, and (2) focus group discussions were organised.

Firstly, 54% of students (n=36) from the reference groups, and 64% of students (n=42) from the intervention and control groups (n=18 and n=24 respectively) submitted a reflection log through the university's portfolio system and agreed to share their data based on informed consent. In this reflection log, students used an open text field to describe a personal feedback experience that they believe contributed the most to their learning in the past semester. Students also used checkboxes to indicate some general aspects related to the feedback experience, such as the context to which the experience was linked (i.e., exercise session, exam, lab report, presentation, etc.), and who was involved in generating the feedback (i.e., teaching staff, peers, themselves, or others).

Secondly, five focus group discussions were organised with the students of the intervention and control groups. The group discussions were organised within the different lab groups, lasted 1 to 1.5 hours, and were allocated in the students' class schedule. A semi-structured format was used, where the facilitator's involvement was

minimized to prompting questions and summarizing discussions to keep focus and spark further discussion amongst participants. To keep participants engaged, they were regularly asked to move within the room to take a stand regarding various statements and then explain why, such as “Would you consider yourself as active or rather passive during feedback processes.”, and “Do you pay attention to the transfer of feedback from one learning experience to another?”. In the intervention group, all students (n=28) participated and agreed to share their data based on informed consent. In the control group, 71% of students (n=27) participated in the group discussions and agreed to share their data.

2.5 Analysis

Both the data from the reflection logs and the focus group discussions were used to evaluate the effect of the learning intervention. The data from the reflection logs were mainly used as quantitative data, where the general aspects of the feedback experiences were summarized by counting the information marked through the checkboxes. The information in the open text field, further describing the feedback experience, was used as supportive qualitative data, and was analysed to see to what extend it supported the quantitative data collected through the checkboxes. Data from the focus group discussions were further used to show students’ general attitudes towards feedback. The focus group discussions were transcribed verbatim and thematically analysed using Nvivo. An inductive coding approach was used. The transcript was first read in depth multiple times while writing down initial codes, after which it was fully coded.

Ethical approval for this study was obtained from the university’s Ethics Committee (G-2020-2354 and G-2022-5693) and participants have consented to be part of this research. They were informed that their participation was voluntary, and that the analysis would be conducted anonymously. All data were collected in Dutch and translated by the first author after analysis.

3 RESULTS AND DISCUSSION

3.1 Effects of the learning intervention

The aim of the intervention was to support the development of student feedback literacy, relying on two well-known learning interventions: discussion of exemplars, and engaging in peer feedback. Since the students in the intervention groups used a rubric to assess their peers’ academic writing of lab reports, these elements were expected to be present in the students’ reflection logs. Table 1 shows an overview of the total number of reflection logs received from each group, detailing (1) the number of students who indicated the process of writing a lab report as their most important feedback experience, and (2) the number of students who indicated both the process of writing a lab report and the involvement of peers. The percentage-numbers hereby refer to the full sample size. For example, 36 reflection logs were collected from students from the reference group. From this group, 21 students (58%) wrote about a project report as being the topic of their most important feedback experience. Of the

36 students, 8 students (22%) wrote about the project report and claimed the involvement of peers in their most important feedback experience. The wording ‘peer feedback’ is explicitly not used in Table 1, as it would suggest the didactic format of using peer feedback assignments, while these reflection logs also contain references to peers outside of these structured assignments.

Table 1. Overview of the reflection logs about a project report involving peers

Academic year	**Group**	**Reflection logs (total)**	Reflection logs about a lab report	Reflection logs about a lab report and involving peers
2021-2022	reference	n=36	n=21 (58%)	n=8 (22%)
2022-2023	control	n=24	n=4 (17%)	n=2 (8%)
	intervention	n=18	n=11 (61%)	n=8 (44%)

Based on the available data, it appears that the process of writing a lab report was claimed more often as their most important feedback experience by students who were engaged in peer feedback, i.e. the students of the reference group (58%) and the students of the intervention group (61%), as opposed to the students in the control group (17%). By organising peer feedback, each individual member of the team is required to use the assessment rubric to analyse reports from other teams. The use of the rubric also emerged during the focus group discussions with the students of the control groups. Despite being discussed extensively in the full-group lecture in the auditorium, and although the submission form in the Learning Management System reminded students of the marking information and included the link to the assessment rubric, the majority of students from the control groups surprisingly commented that they did not use the rubric before submitting their reports. Since students were free to choose their most important feedback experience for their reflection log, the data suggests that engaging in peer feedback and analysing the assessment rubric contributes to students’ learning. Further research should indicate whether it subsequently also motivated students to participate in writing their team report as a joint effort, rather than allowing one student to focus on the writing.

As expected, Table 1 further shows that students in the reference and intervention groups more often claim involvement of their peers in their chosen feedback experience, 22% and 44% respectively, compared to only 8% of students in the control group. Analysis of the data in the open text fields describing the feedback experience shows that the two students in the control group describe personal interactions with peers, such as “*receiving hints on how to use specific functions in Word*” when writing reports, and “*that they had to be clearer during writing as their text was not fully clear to the own team members*”. Furthermore, although eight students of the reference group indicated peers as being part of the peer feedback process, none of them acknowledged their peers in their further description, opposed to seven out of eight students of the intervention group explicitly acknowledging peers with quotes such as “*It's great to get feedback from a fellow student and not always from a teacher,*

because fellow students sometimes look at it from a different angle and you can also learn a lot from that", "*In doing so, fellow students help raise my level*", and "*For me, the most important feedback is the help and feedback from my fellow students.*" This suggests that the learning intervention contributed to students understanding of the value of peer feedback.

Next to that, it was observed during the focus group discussions that students from the intervention groups had a broader view of feedback. They spontaneously mentioned examples outside an educational context, such as feedback from a coach while playing sports. Even when attempts were made to elicit such contexts from students from the control groups by asking about "other situations" or prompting that they needed to "think broadly", they did not mention it until literally asked if none of them played sports. Since all students acknowledged the value of feedback from a coach while practicing sports, having a broader view of feedback and thinking of analogies outside of the educational context, could also motivate students to engage more with feedback within their programme.

3.2 General attitudes towards feedback

The focus group discussions revealed students' personal trait about openness to feedback. When asked about what they would do if they received conflicting feedback information from multiple sources, students from the intervention groups recalled their experiences with peer feedback. They initially accredited the contribution of peers with claims as "*feedback from a student is not inferior*", but also demonstrated some reluctance by statements as "*fellow students have the same knowledge as you, but okay, if they have experienced it in a different way… it might provide a different scope*". In case of conflicting feedback, students would still put teachers' feedback first because "*those are trained for that*" and "*students place less importance on it*". Where students of the intervention groups make a distinction between the level of expertise of peers and teachers, students of the control groups directed the discussions towards the influence of the accessibility of different teachers: "*there are teachers and professors with whom I can ask my questions directly, but with others I might not*", and "*in course X, for example, asking a question is a completely different situation from course Y. In course Y, you can actually hardly do that*". Overall, students from both the intervention and control groups, consent that in the end they will mainly use the feedback "*they understand the most*" or the feedback "*which is the easiest to apply*".

Most students, both in the intervention and in the control groups, showed a preference for easily applicable feedback because "*that's going to work faster as you also correct immediately without the need for reading it again*". Discussions quickly reveal that students experience a high workload within their overall curriculum: "*It requires a lot of work and time. If you want to do everything perfectly, all the steps, you will be working for a very long time. Okay, it might have an effect, but is the effect big enough to take all those steps? We also have more than just that to think about.*" and "*Usually you have so many tasks to do and then you say 'OK, I'm going to spend that morning working on that report and hopefully that will be finished'. Then, if only a limited number*

of items remain, you do it in the evening, but you usually than have to prepare another lab session, or other things, so then you have to see that you have done everything, which actually sometimes puts you under time pressure." Students realised that quickly working through corrective feedback makes it "*much more likely to start making those mistakes again*" by "*not thinking too long about what exactly went wrong*", but the majority of students comforted themselves that they remember the most important aspects in future occasions.

Since most students rely on memorising their feedback, they were asked for examples of how to store feedback so that it can be retrieved afterwards. Only five students spread over the different groups claimed to have a systematic approach. The first student used a small notebook to keep notes in the past, but did so because it was mandatory for a specific course and admitted not having used it again afterwards. A second student said to check earlier assignments, but highlighted that it was also during a specific course with frequent similar technical reporting. A third student wrote down feedback on separate papers and put them with the topic to which it related so that it could be retrieved in the future. A fourth student mentioned using an Excel-sheet in which the feedback is summarized. When working on a new assignment, earlier feedback is checked to prevent making the same mistakes again. The fifth student said to make photos of the feedback with a smartphone, but immediately admitted that they often cannot be retrieved afterwards. These findings highlight the need to support students in storing feedback so that it can be easily retrieved afterwards, and to provide subsequent tasks so that students learn to reuse feedback and further appreciate the purpose of these feedback processes.

4 CONCLUSIONS

Both the analysis of the reflection logs and the focus group discussions indicate that the learning intervention contributed to the understanding of the key concepts and principles of feedback literacy. Students in the intervention groups demonstrated increased awareness of the valuable contribution that peers can make during feedback processes and showed a broader view of feedback. This indicates the importance of teacher feedback literacy in creating an effective feedback environment that helps develop students' feedback literacy. In general, students preferred easily applied feedback because of the minimal time effort required, although they realised that it makes a limited contribution to their learning. Moreover, the majority of students comforted themselves that they will remember their feedback if needed, and only a limited number of students attempted to store and revisit their earlier feedback. Therefore, next to showing the importance of making feedback processes explicit in individual courses, this study suggests putting more emphasis on the learner's active role in relation to their own learning so that they understand that it also requires a time commitment, e.g., by encouraging reflection to get a better understanding of their actual feedback. Furthermore, it would be valuable to give students ideas on how to store and revisit feedback and reflections, e.g., by using feedback logs within a course,

or by providing students with a programme-wide feedback portfolio to encourage feedback transfer.

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