**Peer Feedback Quality And Higher Education Students' Attitude Towards Peer**

**Feedback: Measuring Change Overtime**

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# Contents

**Abstract**

The current study investigated whether there was a change in higher education students' attitude before and after receiving peer feedback. The study also investigated the relationship between the higher education students' attitude towards peer feedback and the quality of received peer feedback. Higher education students (N=65) who participated in an online course delivered through the European Institute of Technology (EIT) were included in the study. Along with the required course assignments, which consisted of writing two essays and giving feedback to four peers' essays, the students filled a questionnaire about their attitudes towards peer feedback. The questionnaire was administered at three different points; before the first assignment, after writing and giving feedback on the first assignment, and after writing and giving feedback on the second assignment. The results revealed that there was a correlation between the students' attitude towards peer feedback and the quality of the received peer feedback after the first assignment. However, there was no correlation between the students' attitude towards peer feedback and the quality of the received peer feedback after the second assignment. Moreover, the results revealed that there was no change in the students' attitude towards peer feedback before and after receiving peer feedback. The study's results call for more research into the role of peer feedback quality, how increasing quality contributes to a more positive attitude towards peer feedback, and how the nature of assignments might affect the students' attitude towards peer feedback.

**Peer Feedback Quality And Higher Education Students' Attitude Towards Peer Feedback:**

**Measuring Change Overtime**

Assessment has been one of the most evident building pillars of formal education for decades (Gielen et al., 2011). With the rise of recent reconceptualisations and challenging of the past building pillars within the educational institutes, there has been a recent shift in the goal and nature of assessment from solely focusing on outcomes to also being used as tools that play a role in the learning process, arising interests in concepts such as peer feedback and peer assessment (Cartney, 2010).

The reason behind this focus is that peer feedback provides countless benefits for all parties involved; the students providing the feedback, the student receiving the feedback, and the teachers. Moreover, feedback has been identified as one of the highest influential factors that can influence students' academic achievement, since peer feedback hits two birds with one stone with the students acting as both examiners and examinees facilitating the engagement of students in their course of learning (Hattie & Timperley, 2007; Simonsmeier et al., 2020). Furthermore, peer feedback can be used in different contexts and for different reasons, for example; as an assessment tool, as a tool for social control (acting as an external motivator since the students are aware that they will be given feedback by their peers), as a tool for self-monitoring and self-regulation, and as a tool for ensuring active participation in the classroom (Gielen et al., 2011). Additionally, peer feedback is a way of ensuring student ownership of learning or learning autonomy, since it plays a key role in involving the students by allowing them to have control over their own learning progress (Conley & French, 2014; Bijami et al., 2013). Likewise, peer feedback that is meaningful enough for students to implement can act as a scaffolding tool to reduce the gap in the students' learning process and expand the learning focus from solely focusing on current work to also focusing on future work (Bijami et al., 2013). Besides its academic benefits, peer feedback is also

considered an important skill to introduce to students because it can be a vital pillar for many other skills, such as critical analysis and decision making, regularly needed in the professional workplace environment (Mutwarasibo, 2016; Van den Berg et al., 2006).

Although the benefits of implementing peer feedback are evident, the issue of how students, who are providing and receiving the peer feedback, perceive the peer feedback process can sometimes hinder the implementation of the peer feedback process. This is because students can be sceptical of their capability to provide peer feedback, even though the quality of peer assessment was found to be highly correlated with the quality of the feedback provided by experts (Tseng & Tsai, 2007). In fact, Huisman et al. (2019) discussed how the development of a certain attitude towards peer feedback can be relevant to the students' experience in providing and receiving peer feedback as well as a result of the peer feedback process. Huisman et al. (2019) related this to the expectancy-value theory stating that when the students expect or believe that the assigned task is beneficial, they are more likely to exert more effort because they perceive the task as valuable hence providing a higher quality of feedback. Moreover, students' attitude towards peer assessment can significantly affect the way students approach learning, including the quality of the peer feedback they provide (Mutwarasibo, 2016).

Despite the vivid importance and the likelihood of change in the students' attitude towards peer feedback and its connection with the quality of the peer feedback received, there is an evident research gap in studying these concepts together. Consequently, this study aims to fill this research gap by studying whether the quality of the provided peer feedback has a role in changing the attitudes of students towards peer feedback and whether their attitudes can significantly change depending on the quality of the received peer feedback. Studying these concepts will help in identifying whether focusing on the concept of providing peer feedback is sufficient enough or focusing more on ensuring that high quality peer feedback is received is also as important.

## Theoretical Framework

This section will first explore the different definitions found in the literature for peer feedback and its counterpart, peer assessment, and then will discuss the definition adopted in the current study. Afterwards, the goals of peer feedback and determining quality of peer feedback will be explored followed by a dive in the attitudes towards peer feedback and ending with discussing the peer feedback challenges and how the current study addressed those challenges. Subsequently, more details about the current study will be introduced along with the research questions.

### Peer Feedback Definitions

To start with, the definition of peer feedback can be considered tricky because different researchers use it to refer to a plethora of things. Starting with the definition of feedback, in general, Hattie and Timperley (2007) defined it as "information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (p.81). Additionally, feedback can be perceived as the aftermath or consequence of performance in something (Hattie & Timperley, 2007). Moreover, giving and receiving feedback can be seen as part of the socio-constructivist paradigm when it includes a dynamic process of providing and receiving suggestions among students to independently edit and revise their work without receiving direct instruction of edits and revisions from the teacher (Archer, 2010 as cited in Evans, 2013).

As for defining peer feedback, the term is sometimes distinguished from peer assessment or used interchangeably. Double et al. (2020) referred to peer assessment as the process of students assessing one another while Reinholz (2016) mentioned that peer assessment can be perceived as an umbrella term that encompasses different activities including providing feedback and providing grades. In line with Reinholz (2016), Van Zundert et al. (2010) stated that providing feedback can

be considered one of the many types of peer assessment, along with grading the work of peers and evaluating performance of peers. On the contrary, when defining peer feedback, Double et al. (2020) referred to it as the specific content and quality of the feedback provided by the peers. Huisman et al. (2019) chose to take a different route and combined both the terms peer feedback and peer assessment with the definition "all task-related information that a learner communicates to a peer of similar status which can be used to modify his or her thinking or behaviour for the purpose of learning" (p.1).

In this study, the terms peer feedback and peer assessment will be used interchangeably adopting the definition by Huisman et al. (2019) and considering peer feedback as a term under the umbrella of peer assessment, as discussed by Reinholz (2016).

**Peer Feedback Goals and Perceived Quality Models**

After defining peer feedback, it is important to note that identifying good peer feedback is sometimes related to its use and to the goal it fulfils. Therefore, this part will introduce the peer feedback goals from the literature and how the quality of peer feedback is determined based on each specific goal.

To start with, investigation of literature on the goals of implementing peer feedback yielded four main goals; its use as an assessment tool, as a tool for instilling social control, as a preparation tool for self-monitoring and self-regulation, and as an active participation tool in the classroom (Gielen et al., 2011). These four main goals are essential pillars in the students' learning process, since they show that peer feedback not only ensures that students learn the content in the short term but also ensures that they learn lifelong skills. The importance of identifying and distinguishing different goals stems from the different quality standards that each goal yields.

To study those goals further, Gielen et al. (2011) created an inventory that was composed of the identified goals of peer feedback. They stressed that it is vital to identify the goal of the

utilised peer assessment before attempting to assess the quality of the provided peer assessment, because different goals require measuring different criteria.

Besides the model of Gielen et al. (2011), Superchi et al. (2019) conducted a study using a methodological systematic review to analyse tools that assess the quality of peer feedback. Hierarchical clustering of the tools revealed nine domains that were mainly used to assess the quality of feedback, namely; relevance, originality, interpretation results, strengths and weaknesses, presentation and organisation, structure of reviewer's comments, characteristics of reviewer's comments, timelessness, and usefulness. These nine domains provide a good baseline that can be helpful when developing tools or rubrics that aim to assess the quality of feedback, which was already implemented in this study's rubric.

Another model for assessing the quality of feedback was created by Hattie and Timperley (2007). They proposed three questions that pave the road to efficient feedback; "Where am I going?", "How am I going?", and "Where to next?" (p.86). The goal of these questions is not to be addressed separately but to be integrated together in a framework that allows intersections and relations to occur along the course of giving and receiving feedback. This model was used along with the model by Gielen et al. (2011) and other models to create the rubric for measuring the quality of received peer feedback. Therefore, more details about these models will be presented in the methodology section.

To provide an overview, Gielen et al. (2011), Superchi et al. (2019), and Hattie and Timperley (2007) provided an extensive look at peer feedback from many different angles which can be useful for implementing peer feedback in different situations. Gielen et al. (2011) identified five goals for using peer feedback and how the quality of feedback can be measured for each of the different goals. Superchi et al. (2019) mainly focused on scanning the tools that previous researchers have used to measure the quality of feedback and identifying the key common qualities

that were the main focus of the tools. Hattie and Timperley (2007) suggested putting three questions into consideration in order to provide a good and efficient high quality peer feedback. As a conclusion, these models provide different dimensions for peer feedback that can be used as follows; the model by Gielen et al. (2011) for identifying the goal of the peer feedback task and how the quality will be measured before its implementation, the questions by Hattie and Timperley (2007) as a reference during the process of providing the peer feedback, and the qualities identified by Superchi et al. (2019) to analyse and assess the quality of the provided feedback after the peer feedback process is completed. In this study, the peer feedback qualities identified by Superchi et al. (2019), the model by Hattie and Timperley (2007), and the model by Gielen et al. (2011) along with input from other research studies were used as references for the criteria created for measuring the quality of peer feedback and the goals identified by Gielen et al. (2011) was mostly used as a baseline for the questionnaire used to measure the attitudes of students towards peer feedback.

**Attitudes Towards Peer Feedback**

As mentioned before, the attitudes of students towards peer feedback can influence the willingness of the students to engage in the task. In fact, studying the attitudes of students towards peer feedback revealed that their attitudes can fluctuate based on their experience (Huisman et al., 2019). Therefore, different researchers (e.g., Gielen et al., 2011; Hattie & Timperley, 2007; Superchi et al., 2019) focused on the aspects that can contribute to receiving high quality peer feedback to ensure that the students have a positive experience during the process of implementing peer feedback, and a positive attitude towards peer feedback in return. Moreover, Mutwarasibo (2016) concluded that the students' attitudes towards peer assessment are liable to change after being subjected to the peer assessment process and experience as a whole, shifting from a neutral or negative attitude towards a more positive attitude. Additionally, other findings revealed that putting certain measures into consideration, such as providing students with training prior to the

peer assessment process, can contribute to changing their negative attitudes towards peer assessment to adopt a more positive attitude towards peer assessment (Van Zundert et al., 2010). Additionally, partaking in the peer assessment process shifted the students' attitudes from a negative attitude to a more positive attitude after being doubtful and sceptical about their competences and confidence in providing meaningful peer assessment (Venables & Summit, 2003 as cited in Van Zundert et al., 2010). Another study revealed that students who have been previously engaged in peer assessment had a more overall positive attitude towards peer assessment in comparison to their peers who have not been previously involved in peer assessment (Wen & Tsai, 2006 as cited in Van Zundert et al., 2010).

In addition to researchers focusing on studying attitudes and beliefs of students towards peer feedback, other researchers have attempted to create instruments to assess the beliefs of students towards peer feedback (e.g., Huisman et al., 2019; Kuyyogsuy, 2019). As an attempt to learn more in depth about the attitudes of the students towards peer feedback, the study conducted by Huisman et al. (2019) adopted four themes as the basis for developing the Beliefs about Peer-Feedback Questionnaire (BPFQ); valuation of peer-feedback as an instructional method ('VIM'), confidence in own peer-feedback quality ('CO'), confidence in quality of received peer-feedback ('CR'), and valuation of peer-feedback as an important skill ('VPS'). Those four themes combined relate to the aforementioned importance of peer feedback. They are also similar to the ones previously developed by Gielen et al. (2011); peer assessment as a tool for social control, as an assessment tool, as a learning tool, as a tool for learning how to assess, and as a tool for ensuring active participation. Moreover, those four themes are also, according to Huisman et al. (2019), related to the expectancy-value theory that stated that the expectancy of value of a skill is a determinant in the amount of dedicated effort to develop it. This can also be related to the amount of effort students exert to increase the quality and the quantity of the provided feedback, which

plays a role in the attitudes of the students towards the idea and concept of peer feedback in return (Cartney, 2010). Therefore, to put those studies into the context of this study, it can be inferred that peer feedback is an important process to learn and that the higher the quality of the received peer feedback, the higher the positivity of the students' attitudes towards peer feedback.

**Peer Feedback Challenges**

Besides identifying the importance of implementing peer feedback, the ways of identifying the quality, and the attitudes of students towards the received peer feedback, researchers have also focused on studying the sources of hindrance that are associated with peer feedback. This is because knowing the challenges and addressing them during the process of peer feedback implementation can play a role in having a better peer feedback experience and hence, better attitudes towards peer feedback. For example, Cartney (2010) stated that even though receiving feedback is important and beneficial for students, being able to actually use and implement the feedback is quite as important. Moreover, Cartney (2010) added that being able to implement the feedback on the same assessment allows the students to feel more included and more integrated within the assessment process, which in return plays a role in having a higher sense of ownership along with the teachers. This is related to the importance of ownership of learning later discussed by Conley and French (2014). Furthermore, providing relevant personalised feedback has been found more beneficial than automated positive or negative feedback (Hattie & Timperley, 2007).

Some of the concerns and challenges that arise from the students' perspective when they provide peer feedback is that they think that they are not competent enough to give feedback and that they are afraid that they will be too critical and make the feedback receiver upset (Cartney, 2010). This concern can be countered by providing pre-training to the students prior to the peer feedback process, as studies revealed that incorporating training played a positive impact in the development of the skill of peer assessment (Van den Berg et al., 2006; Van Zundert et al., 2010;

Bijami et al., 2013). Another way to combat this challenge is to use a marking sheet or a rubric to help the students with the assessment criteria. This has been reported by the students as beneficial when assessing other students' work as well as when reflecting on their own work after providing feedback to their peers (Cartney, 2010). This also aligns with the work of Reinholz (2015), who stressed the importance of goal awareness and the role it plays in acing the required task. By countering this concern, the teachers can be relieved that the students would be able to take part in the peer feedback process without having a negative attitude towards peer feedback, which can hinder the willingness of the students to fully participate in the peer feedback process, as mentioned previously. In the current study, this concern identified by students in previous studies was addressed by providing the students with brief pre-training as well as providing the students with a rubric to use when giving peer feedback.

Another concern from the students who participated in the study by Cartney (2010) was that they were anxious about how their peers perceive them and their writing. However, this anxiety could be alleviated by providing and receiving feedback about the task itself instead of providing self-directed peer feedback that can elicit more anxiety and self-doubt, as described by Hattie and Timperley (2007). Therefore, the students in the current study were advised to give peer feedback related to how to improve the task, relevant to the level of feedback about the processing of the task (FP) introduced by Hattie and Timperley (2007), instead of giving personal feedback directed at their fellow peers and how they are incompetent for writing a certain part in a certain way.

**Current Study**

Even though the research literature discussed until this point has tackled some aspects related to the quality peer feedback and the students' attitude towards peer feedback, there is still an evident gap in studying the interaction between the two variables that needs to be filled.

Therefore, this study aims to bridge this gap by providing insight into a less explored sub-topic in the peer feedback research by studying whether the attitudes of students in higher education will change after giving and receiving peer feedback from their fellow students. Moreover, the study will examine whether the attitudes of students towards peer feedback was influenced by the quality of the feedback that they have received from their peers. The study will do this whilst putting into consideration the identified characteristics in previous studies (e.g., Cartney, 2010; Topping, 2017) which discussed determinants of peer feedback quality, increasing the positive attitudes towards peer feedback, and the effective ways of countering peer feedback challenges by using rubrics, pre pre-training, and task related feedback. Specifically, the study aims to answer the following questions

1. Does the attitude of higher education students towards peer feedback change after receiving peer feedback from their peers?

2. Are the attitudes of higher education students towards peer feedback correlated with the quality of the feedback that they receive from their peers?

## Methodology

### Participants and Course

The participants of the study were selected from an online course called "Innovation and Entrepreneurship Basics Module". The participants were from three different universities; KTH Royal Institute of Technology in Sweden, Université Côte d'Azur (UCA) in France, and University of Turku (U Turku) in Finland. The course was an online course delivered through the European Institute of Technology (EIT) online learning management system (LMS) platform. The average age of the participants was 24 and the age ranged between 20 and 38. 20 were females, 44 were males, and one student did not specify gender. The total number of participants who provided informed consent was 65.

Participation in the peer feedback procedure was part of the normal curriculum of the course. Students were informed about the fact that they could participate in a research study during the course. They received information about the nature of the study and ethical issues related to the data collection and data storage. Students who considered participating in the study were asked to complete an informed consent procedure. Only data from participants who provided informed consent were included in the data analysis.

The goal of the course was to teach students skills that they can transfer to their work experience as well as their personal lives, including but not limited to critical thinking, giving peer feedback, and processing provided peer feedback.

**Materials**

*Course*

Participants were required to submit two different essay assignments as well as provide peer feedback to two assignments submitted by two of their peers and respond to the feedback that they received.  Peer reviewing was supported by a rubric. The first assignment was about "Digital Transformation" and the second was about "Design Thinking". In addition to the required assignments, the students were asked to complete an attitude questionnaire. The duration of each assignment cycle was two weeks, which included writing the essay, giving feedback, reviewing, and submitting the essay, and replying to their peers.

**Assignments.** The first assignment addressed digital transformation and students were asked to choose between two topics. The first topic focussed on the challenges that the newspaper industry was confronted with and how these challenges are surmounted. The second topic focussed on upcoming industries that are expected to encounter comparable advancement. The second assignment addressed design thinking and was divided into four main subtasks. In the first subtask, the students were asked to read an article by The Economist Newspaper (2016) about water

shortage, focus on an issue of interest, and elaborate on it. In the second subtask, the students were asked to report and reflect on their key observations from the first subtask. In the third subtask, the students were asked to include a concise design based imperative question to explain the main issue that they think should be the focal point. Lastly, the students were asked in the fourth subtask to provide key ideas based on the question developed in the previous task.

The students were provided with guidelines on the expected layout of the essay, which was divided into three parts; an introduction, main body, and conclusion. Additionally, the students were informed of the required word count, which was around 1000 words. The students were also provided with information on the required essay layout for each assignment besides the information provided on how to prepare for writing each required essay. The students were also provided with the deadline for the initial submission of their essays for the peer feedback, the deadline of submitting the peer feedback, and the deadline for responding to the received peer feedback.

**Rubric for peer review.** After writing each of the essays, the students were asked to give peer feedback to two of their peers on their essays by following the provided rubric.

**Reaction form.** Afterwards, the students were asked to write an email with a reaction to the peer feedback that they received. They were provided with instructions on mentioning the points they found helpful, the points they found irrelevant or ambiguous, and the points that they gained from the received feedback.

### Attitude Towards Peer Feedback Questionnaire

A questionnaire was administered to assess the students' attitude towards peer feedback before, during, and after completion of the peer review process. The questionnaire was composed of 25 questions that were divided into six different sections that included 3-5 questions each. The

questionnaire was developed based on the goals of peer assessment described by Gielen et al. (2011) and by Huisman et al. (2019).

The first goal of peer assessment, described by Gielen et al. (2011), is using it as a means of instilling social control in students through two mechanisms, ensuring that the students are actively participating in the learning activities and putting more effort in tasks that are assessed by their peers because they are self-conscious about what others think of them. The second goal is using peer assessment as an assessment tool. The third goal for peer assessment is using it as a learning tool rather than just an assessment tool. The process of using peer assessment as a learning tool entails three subgoals; assessment of learning, assessing for learning, and peer learning. These three processes ensure that the students learn from the feedback that they receive, from the feedback that they give to other students, and from the process of peer feedback itself. The fourth goal for using peer feedback is to be used as a means of learning how to assess, which is an important learning skill on the meta level that is beneficial for lifelong learning. The fifth goal of implementing peer feedback is using it as a tool for ensuring that the students are active participants in the learning and assessment, which is related to ensuring student autonomy and feeling of control.

Based on the aforementioned goals and the questionnaire developed by Huisman et al. (2019), the six subsections that this study's questionnaire entailed are motivating students/showing the usefulness of peer feedback, peer feedback as social control tool, peer feedback as an assessment tool, peer feedback as a learning tool, peer feedback as a learning how to assess tool, and peer feedback as an active participation tool. An example for an item under the first subsection, motivating students/showing the usefulness of peer feedback, is "Being capable of giving constructive peer feedback is an important skill". Another example of a question under the second subsection, PF as a social control tool, is "Peer feedback ensures that I put effort into my

assignments". The entire questionnaire can be found in Appendix A. The questions of the questionnaire were answered on a scale from 1 to 6; with one corresponding to completely disagree, 2 to disagree, 3 to neither agree or disagree, 4 to agree, 5 completely agree, and 6 to no opinion. The validity of the questionnaire was ensured since it was based on existing and previously used instruments. The reliability was calculated using Cronbach's alpha, which revealed that the questionnaire was highly reliable (25 questions; $\alpha = .954$).

**Procedure**

Before starting the study, ethical approval was provided through the Ethics committee at the University of Twente. After getting the ethical approval, the study started with the students receiving some information about the process of the peer assessment, its goals, and its role in learning. Moreover, they received some instructions about the procedure, assessment rubric, and the explanation through a video posted on the EIT LMS. After being introduced to the study, the students were asked to provide their informed consent to participate in the study and they were ensured that their data will only be shared with the team of researchers. The informed consent included an introduction to the study, a description and purpose of the study, the expectation from the participants of the study, emphasis on the voluntary participation in the study, information about the data storing, and the contacts of the researchers for asking questions.

After giving their informed consent, the participating students filled in the pre-test, the attitude test. Afterwards, the students submitted their first draft and then received two drafts written by their peers to provide peer feedback to the writers of those two draft essays. After they assessed these two drafts and submitted the peer review to their peers, the students worked on editing their final version of the essay through implementing the peer feedback that they have received from their peers. After working on their final edits, the students submitted the final version of their essays. Afterwards, the students filled in the same attitudes towards peer feedback questionnaire a

second time. Afterwards, the students submitted their first drafts of the second essay, submitted two peer reviews, received peer reviews for their second essay, edited their essay through implementing the received feedback, and submitted the final version of the second essay. After submitting the second essay, the students filled in the post-test, the attitudes questionnaire for the third time.

**Data analysis**

*Coding scheme*

In order to assess the quality of the provided peer feedback, a coding scheme needed to be developed. The coding scheme was based on quality markers that were derived from several studies on peer feedback (Huisman et al., 2019; Poot et al., 2020; Superchi et al., 2019; Cartney, 2010; Hattie & Timperley 2007). The entire coding scheme can be found in Appendix B.

The scheme distinguished between the different qualities of the peer feedback. The criteria were developed based on previously identified quality determinants of peer feedback by several researchers (Huisman et al., 2019; Poot et al., 2020; Superchi et al., 2019; Cartney, 2010; Hattie & Timperley 2007). The answer to the question "Where am I going?" is related to having a goal and using the feedback to reach that goal (Hattie & Timperley, 2007). In this study's rubric, this question is referred to using the criterion "concreteness", since it addresses the applicability of the given feedback and its relevance to the goals of the assignments and the subgoals included in the feedback rubric that was provided to students. The question of "How am I going?" denotes to the elements of feedback that the students are doing in the right direction or wrong direction (Hattie & Timperley, 2007). In this study's rubric, this question is related to the criterion "constructive criticism" as it addresses how the students gave feedback about the shortcomings of the assignments and how to tackle these shortcomings to improve the essays further. The question "Where to next" refers to the feed forward that is provided to the students to attain a certain

consequence, which makes this question address not only a shorter-term focus on a specific assignment but also a longer-term goal for life (Hattie & Timperley, 2007). In this study, this question is not correlated with a specific criterion in the created rubric but rather is related to the goal of the use of peer feedback as a whole to teach the students a life skill that they need in their professional life inside and outside the university. In this study's rubric, feedback about the processing of the task (FP level), identified by Hattie and Timperley (2007), is the main dominant level required from the students. According to Hattie and Timperley (2007), feedback on the level processing the task (FP) is centred on how the task is completed and how it can be improved.

Based on the discussed models, the final rubric used in this study to measure peer feedback quality was composed of five criteria; aggressive tone, concreteness, relevance to the task, constructive criticism, and rubric implementation. All of the criteria, except for rubric implementation, were appointed on a three-point scale from 0-2 with 2 referring to fully fulfilling the criteria, 1 to partially fulfilling the criteria, and 0 to not fulfilling the criteria. The rubric implementation criterion was rated on a 2-point scale, 0 and 1, with 1 denoting to fulfilling the criteria and 0 to not fulfilling the criteria. The difference between the difference scores between 0 and 2 was the percentage of the provided feedback and suggestions abiding by each criterion. For example, for the concreteness criterion, scoring 2 refers to the feedback being 70% concrete while scoring a 1 refers to being 50% concrete, and scoring a 0 refers to being less than 50% concrete. The scores of aggressiveness were reversed so that 2 became 0, 0 became 2, and 1 stayed 1. Content validity was ensured through expert researchers in the field assessing the validity of the developed rubric.

To get an insight into how the quality of the feedback was coded using the rubric, the following examples will demonstrate the coding process. For example, for this peer feedback provided by a student "The conclusion can be improved next time with a sort summary of the

arguments to address your statements. Now the conclusion is a bit weak and short, so spending some more words and using your results makes the text a lot stronger", this was coded in the constructive criticism criterion as a 2 (fully fulfilling the criteria). The reasoning behind coding this as a 2 is that the student mentioned what was wrong and mentioned how to fix it in order to improve that part of the essay. As previously mentioned, the difference between coding certain provided peer feedback as a 1 or 2 is the frequency of the prevalence of the criteria. As mentioned in the rubric in Appendix B, if most of the feedback (70%) fulfils the constructive criticism criteria, for example, the peer feedback was coded in this particular criterion as a 2. However, if 50% to 70% of the provided peer feedback fulfilled the constructive criticism criteria, then a 1 was. If less than 50% fulfils that criterion, then 0 was appointed. All the criteria followed this line of reasoning of the frequency being one of the determinants of the assigned code, except for rubric implementation criterion, which was appointed a binary code meaning only 0 and 1 are the code options.

After developing the rubric, the quality of the provided peer feedback on each assignment was coded by 2 coders based on the designed rubric. After the coding was finished, the scores were summed and used for the inferential analysis. Moreover, inter-rater reliability between the two coders was measured using Intra-class Correlation Coefficient (ICC) to determine the reliability of the rubric for the quality of peer feedback given for both assignments. According to the criteria set by Koo and Li (2016), the ICC results reported for the digital transformation assignment indicate good reliability. The average measure ICC was .755 with a 95% confidence interval from .651 to .829 ($F (122, 122) = 4.089$, $p < .001$). Moreover, according to the criteria by Koo and Li (2016), the ICC results reported for the digital transformation assignment indicate moderate reliability. The average measure ICC was .654 with a 95% confidence interval from .506 to .757 ($F (123, 123) = 2.888$, $p < .001$).

### Statistical analysis

After gathering all the data, the quality of the peer feedback was coded based on a rubric developed by the researcher and the results of the other questionnaires were analysed using Statistical Package for the Social Sciences (SPSS). In the following sections, the statistical analysis tests used in the study and their interpretations are specified in more detail.

## Results

The results section reports the results of the different statistical analyses that were used to analyse the data. This section is clustered by research question and its relevant tests, meaning that each research question and its corresponding tests are reported respectively. Before reporting the results, the abbreviations that will be used throughout the results section and what they denote to in the study will be explained.

## Abbreviations Explanations

To start with, *Attitude 1* is used to refer to the total score in the attitudes towards peer feedback questionnaire that was conducted before the first assignment (digital transformation assignment). *Attitude 2* is used to refer to the total score in the attitudes towards peer feedback questionnaire that was conducted after the first assignment (digital transformation assignment) and before the second assignment (design thinking assignment). *Attitude 3* is used to refer to the total score in the attitudes towards peer feedback questionnaire that was conducted after the second assignment (design thinking assignment). *Assignment 1 Received PF* is used to refer to the total of the received peer feedback from both peers for the first assignment (digital transformation assignment). *Assignment 2 Received PF* is used to refer to the total of the received peer feedback from both peers for the second assignment (design thinking assignment). *Quality of PF* is used to refer to the total of the quality of the received peer feedback coded using the developed coding criteria/rubric for the received peer feedback from both peers.

**Analysis**

To start with, to answer the first research question "Does the attitude of higher education students towards peer feedback change after receiving peer feedback from their peers?" One Way Repeated Measures ANOVA was used.

The descriptive statistics for the scores of the attitudes towards peer feedback questionnaire can be found in Table 1. The repeated-measures ANOVA determined that mean attitudes towards peer feedback scores did not differ significantly across the three-time points; before receiving peer feedback on the first assignment ($M = 94.96$, $SD = 16.13$), after receiving peer feedback on the first assignment ($M = 92.47$, $SD = 19.10$), and after receiving peer feedback on the second assignment ($M = 92.40$, $SD = 20.44$) ($F (1, 56) = 2.230$, $p = .141$).

Moving on, a Pearson correlation analysis was used to measure the correlation between the variables in order to address the second research question "Are the attitudes of higher education students towards peer feedback correlated with the quality of the feedback that they receive from their peers?". A Pearson correlation coefficient was computed to assess the linear relationship between the quality of received peer feedback on Assignment 1 (digital transformation) ($M = 12.6$, $SD = 3.79$) and Attitude 2 (attitude of the students towards peer feedback after giving and receiving peer feedback on assignment 1) ($M = 92.6$, $SD = 18.96$). There was a statistically significant positive correlation between the two variables, $r (56) = .808$, $p = .033$. A Pearson correlation coefficient was computed to assess the linear relationship between the quality of received peer feedback on Assignment 2 (design thinking) ($M = 14.21$, $SD = 3.89$) and Attitude 3 (attitude of the students towards peer feedback after giving and receiving peer feedback on assignment 2) ($M = 90.62$, $SD = 21.45$). There was a non-statistically significant positive correlation between the two variables, $r (63) = -.067$, $p = .599$.

Based on these correlations, it can be concluded that there was a statistically significant positive correlation between the attitudes of the students towards peer feedback before receiving any peer feedback and the quality of the received peer feedback in the first assignment. However, there was no statistically significant correlation between the quality of the received feedback on the second assignment and the attitudes of the students towards peer feedback after receiving peer feedback on the second assignment. It is important to note that the means and standard deviations calculated for the Pearson correlations and ANOVA are not the same. This is due to the fact that the students' responses for the attitude questionnaire in the three times and the feedback given in each of the two assignments consisted of a different number of students every time. For example, a student might have answered the attitude questionnaire the first and third time and gave peer feedback on the two assignments. However, another student might have answered the questionnaire the first time only and gave feedback on the two assignments. These different combinations are the reason behind the fluctuations of the means and standard deviations.

## Discussion

The current study aimed to bridge the gap in the research regarding peer feedback specifically through studying whether there would be a difference in the attitudes of the students towards peer feedback before and after they received and provided peer feedback. Moreover, the study aimed to examine whether the attitudes of students towards peer feedback was correlated with the quality of the feedback that they have received from their peers.

The results of the study revealed some predicted and some interesting findings since they both matched and contradicted the findings of previous research about peer feedback. In the following paragraphs, the interpretations from the results will be presented along with the possible explanations for those results. Afterwards, the subsequent paragraphs will include the limitations of the study and suggestions for further research on the topic.

Starting with the significant results, a statistically significant positive correlation was found between the attitudes of the students towards peer feedback after receiving peer feedback on the first assignment and the quality of the received peer feedback on the first assignment. This significant correlation is aligned with the previous findings of Gielen et al. (2011), Hattie & Timperley (2007), and Superchi et al. (2019) who concluded that the students' attitude towards peer feedback is correlated with their experience with the peer feedback process. This positive correlation shows that not only is the experience of peer feedback an important factor, the quality of the feedback is also quite important for students. What makes this finding interesting though is that there was no statistically significant correlation between the quality of the received feedback on the second assignment and the attitudes of the students towards peer feedback after receiving peer feedback on the second assignment. This could be explained by the quality and the content of the received feedback itself on each of the assignments, which is relevant to the discussion of Hattie and Timperley (2007) about not all forms of received peer feedback being useful and impactful. Moreover, this could also align with the previously mentioned work of Topping (2017) who described how the varying nature of feedback can have a positive or negative impact on the process or the attitudes of students towards peer feedback in the case of the current study. The nature of the peer feedback was different from that of the other studies as it had different characteristics such as being online, non-anonymous, varying quality, varying backgrounds, and being far peers. However, it is an interesting finding that the correlations between the quality of the received peer feedback and the students' attitudes towards peer feedback in the first and second assignments were conflicting. These contradictory results could also be due to the different nature of each assignment. Therefore, the answer to the second research question of this study "Are the attitudes of higher education students towards peer feedback correlated with the quality of the feedback that they receive from their peers?" can be considered a yes and no. These contradictory

results call for more research on this topic to determine whether there is an actual correlation or not, to determine the reasons behind these contradictory results, and to have an insight of certain conditions that could play an influential role.

Moving on to the first research question "Does the attitude of higher education students towards peer feedback change after receiving peer feedback from their peers?", the analysis revealed that there was no significant change in the attitudes of the students towards peer feedback overtime. Even though it was predicted, according to the previous findings, to find a change over time in the attitudes of the students towards peer feedback, the results revealed otherwise, showing that the attitudes neither changed to a more positive or even a more negative attitude. These nonsignificant results can be due to the fact that the interaction between the students who participated in the course was scarce and that they can be considered far peers, according to Topping (2017). To further elaborate, Topping (2017) explained that the students' attitudes towards peer feedback can differ due to different factors, which included the students being far peers in contrast to near peers. It is, however, interesting to further study whether attitudes towards peer feedback change overtime after receiving peer feedback at different points in future research to determine whether these nonsignificant results were incidental and due to the specific conditions of this study or there are specific conditions and factors that play a role in the presence or absence of change overtime. Moreover, the absence of significant change may be due to the students having a strong certain attitude from the beginning that the received peer feedback was not effective enough to change that initial attitude. Furthermore, the non-significant change of attitudes overtime can be due to the fact that the timespan of the course was quite short and the time interval for each assignment was small. This short time period could explain the reason why the students' attitudes did not change overtime. On another note, it is interesting to point out that the mean of the quality of received peer feedback shows an increase in the quality from the first to the second

assignment. This could indicate that even if the students' attitudes towards peer feedback did not significantly change overtime, the quality of the received feedback might have increased overtime. Therefore, it would be interesting to investigate this point further in upcoming research on this topic.

**Limitations and Suggestions**

Like every study, the current study has few limitations. Firstly, the pre-training that was provided to students about peer feedback was very brief. For future studies, it would be better and more beneficial to provide the students with a more extensive pre-training, perhaps adding an interactive part in which the students can practise using some or all elements of the rubric to provide peer feedback to their fellow peers. Another limitation that goes along with the varying backgrounds or abilities is that some students didn't provide high quality feedback because they did not think that they are capable enough or experienced enough to provide peer feedback. This aligns with the concerns that Cartney (2010) described before about students not feeling like they are competent enough to provide peer feedback. This limitation could also be addressed in future research by providing more extensive pre-training for students to learn about giving better feedback and to practice giving effective peer feedback with tips on how to improve. Another limitation is that the timespan of the course was short, which may have played a role in some aspects of this study.

In conclusion, the current study investigated whether there is a difference in the attitudes of higher education students towards peer feedback before and after receiving peer feedback. The study also measured the correlation between the quality of the received peer feedback and the attitudes of the students towards peer feedback. The results revealed that there was a positive correlation between the quality of the received peer feedback in the first assignment and the attitudes of the students towards peer feedback before receiving any peer feedback. However, the

results revealed that there was no significant correlation between the quality of the received peer feedback in the second assignment and the attitudes of the students towards peer feedback after receiving peer feedback on the second assignment. Moreover, the results revealed that the attitudes of the students towards peer feedback did not significantly change overtime, after receiving peer feedback. These results open the floor for further research on the quality of peer feedback and its role in the attitudes of students towards peer feedback in different contexts and in different circumstances.

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## Appendix A

### Attitudes Towards Peer Feedback Questionnaire

**Goal: motivating students/showing the usefulness of peer feedback**

Q1. The following statements concern the use of peer feedback. Indicate for each statement to what extent you agree.

| | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|
| Involving students in feedback through the use of peer-feedback is meaningful. (1) | O | O | O | O | O | O |
| Peer feedback within this course is useful. (2) | O | O | O | O | O | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| Being capable of giving constructive peer feedback is an important skill. (3) | o | o | o | o | o | o |
| Being capable of dealing with critical peer feedback is an important skill. (4) | o | o | o | o | o | o |
| Being capable of improving one's work based on received peer feedback is an important skill. (5) | o | o | o | o | o | o |

**Goal: PF as social control tool**

Q2. Indicate for each statement to what extent you agree.

| | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|
| Peer feedback motivates me to perform my assignments on time. (1) | O | O | O | O | O | O |
| Peer feedback ensures that I put effort into my assignments. (2) | O | O | O | O | O | O |
| Peer feedback ensures that I | O | O | O | O | O | O |

am better

prepared. (3)

---

**Goal: PF as an assessment tool**

Q3. Indicate for each statement to what extent you agree.

|  | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|
| Peer feedback from fellow students is just as valuable to me as feedback from the teacher. (1) | O | O | O | O | O | O |

I have as
much faith
in peer
feedback
from fellow
students as
in teacher
feedback.
(2)

    o      o      o      o      o      o

Feedback
should *only*
be provided
by the
teaching
staff. (3)

    o      o      o      o      o      o

In general, I
am
confident
that the peer
feedback I
*provide* to
other
students is
of good
quality. (4)

    o        o        o        o        o        o

In general, I
am
confident
that the peer
feedback I
*receive*
from other
students is
of good
quality. (5)

    o        o        o        o        o        o

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**Goal: PF as a learning tool**

Q4. Indicate for each statement to what extent you agree.

| | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|
| In general, I am confident that the peer feedback I provide to other students helps them to improve their work. (1) | o | o | o | o | o | o |

In general, I am confident that the peer feedback I receive from other students helps me to improve my work. (2)

o                o                o                o                o                o

I learn from giving peer feedback to fellow students. (3)

o                o                o                o                o                o

| | | | | | | |
|---|---|---|---|---|---|---|
| I learn from the peer feedback that I receive from fellow students. (4) | o | o | o | o | o | o |
| Giving peer feedback helps me improve my own work. (5) | o | o | o | o | o | o |

**Goal: PF as learning-how-to-assess tool**

Q5. Indicate for each statement to what extent you agree.

| | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Peer feedback allows me to properly assess the quality of my own work. (1) | o | o | o | o | o | o |
| Peer feedback ensures that I can work independently. (2) | o | o | o | o | o | o |
| Through peer feedback I learn to reflect critically on my own work. (3) | o | o | o | o | o | o |

**Goal: PF as an active participation tool**

Q6. Indicate for each statement to what extent you agree.

| | Completely disagree | Disagree | Neither agree nor disagree | Agree | Completely agree | No opinion |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Peer feedback makes me more aware of the assessment criteria for this course. (1) | o | o | o | o | o | o |
| Peer feedback makes me feel responsible for my own learning process. (2) | o | o | o | o | o | o |
| Peer feedback makes me feel responsible for the learning process of others. (3) | o | o | o | o | o | o |

Peer feedback        o            o            o            o            o            o

ensures an

equal

relationship

between the

teacher and the

students. (4)

---

**Practical use**

Q7.1 You are now at the end of the questionnaire. If you have any questions or comments, you

can enter them below.

_____

_____

**Appendix B**

**Criteria for evaluating peer feedback**

| Criteria | (2) Fully fulfils the criteria | (1) Partially fulfils the criteria | (0) Doesn't fulfil the criteria |
|---|---|---|---|
| **Aggressive tone** Definition: attacking the person while stating the point instead of stating the point directly, for example, "you are contradicting yourself" vs the paragraph is contradicting; I do not particularly like… | The feedback is mostly (70%) aggressive and is directly attacking the person. Ex: Great follow up paragraph until the author just puts facts and no backup arguments. Author contradicts itself on many points in a single paragraph. | The feedback is partially (50%) aggressive and is directly attacking the person. Ex: I do not particularly like when letters are not at the same level, as I find it distracting and rather hard to read. | The feedback is calm and is not directly attacking the person. Ex: The only criticism on my part is that you did not have a proper question and thus the purpose of the text is not exactly apparent. |
| **Concreteness** Definition: specific, not | The feedback is mostly (70%) concrete. | The feedback is mostly (50%) concrete. | The feedback is not concrete. |

abstract, with clear applicable next steps. The differences between scoring 2 and 1 is the percentage of the "concreteness" in the given feedback.

Ex: Maybe a small thing I felt was that the 2nd and 3rd paragraph of the main section started a little abruptly. Maybe you could start in a way that can give us an idea on what is expected in that paragraph. For example, the 4th paragraph of the main section felt more of a smooth start.

Ex: The only problem that comes up in my head is that your writing style is too academic. I checked the description of this assignment. There is a sentence mentioned that we are writing for a student magazine. I rarely read magazines, so I am not sure if writing in the style of an academic paper is suitable for a student magazine. From a reader's view, this article is like a literature review.

| **Relevance to the task** (Superchi et al., 2019 (fairness); (Huisman et al., 2018; Hattie & Timperley 2007; Cartney, 2010) The differences between scoring 2 and 1 is the percentage of the "relevance" in the given feedback. If the student only gives self-directed feedback about the self as a person, then would be given a 0. If most (70%) of the feedback is task related | The feedback is mostly (70%) focused on the task. Ex: The introduction clearly states the topic of the essay and addresses why this is an important topic. | The feedback is partially (50%) focused on the task. | The feedback is barely (<50%) focused on the task or is solely giving self-directed feedback about the self as a person. Ex: "This is a self-starter – someone who always finds out the right thing to do and gets on with the job. If a manager has given no guidance, the author will still take appropriate action. If the required tools are unavailable, she is able to improvise. I could see that the author completed this task to a high |
|---|---|---|---|

| | | | |
|---|---|---|---|
| feedback, then a 2. If only half (50%) is task relevant then 1, if less than 50% then 0. | | | standard. Care and accuracy is obvious even when put under pressure of time. My appreciation for the author is about being on time and detail oriented". |
| **Constructive criticism** (Superchi et al., 2019; Huisman et al., 2018; Hattie & Timperley, 2007) The differences between scoring 2 and 1 is the percentage of the "constructive criticism" in the given feedback. If | The feedback is mostly (70%) constructive meaning that it is stating what needs to be improved along with suggestions for improvements. Ex: "A suggestion for improvement would be to have a reference list in the end of the report". "The conclusion can | The feedback is partially (50%) constructive meaning that it is stating some of what needs to be improved along with some suggestions for improvements. | The feedback is nonconstructive, meaning that it is not stating what needs to be improved with no suggestions for improvements or the suggestions for improvement points are <50%. Ex: "Ideas are very clear and concise. Furthermore, it tries to engage the reader |

most of what needs improvement is provided with suggestions, then a 2. If half of what needs to be improved is provided with suggestions, then a 1. If there are no suggestions at all or if less than 50% of the points of improvements are provided with suggestions, then a 0.

be improved next time with a sort summary of the arguments to address your statements. Now the conclusion is a bit weak and short, so spending some more words and using your results makes the text a lot stronger".

with frequent questions in the text. Good job!"

**Rubric implementation** (Poot et al., n.d.; Cartney, 2010)

The student used the rubric as a guidance to score and to give

The student did not use the rubric as a guidance to score or

| feedback to their peers. | to give feedback to their peers. |
| Ex: The introduction partly addresses the target audience defined in the task. (0,5 points). | |