

Master Thesis in Educational Science and Technology

Training Technical University Teachers on Peer Feedback to Improve Motivation for Implementing Peer Feedback in Their Teaching

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Abstract

Student learning in higher education can be arranged in many different and effective ways. Letting students participate in peer feedback can lead to multiple positive learning outcomes for both students and teachers, making peer feedback a useful tool for both groups. For peer feedback to be successful, teachers need to prepare students for their participation in a peer feedback activity. However, teachers have indicated in prior studies they are unsure of how to prepare students, and lack knowledge about and skills in peer feedback themselves. This lack of certainty was mentioned as a possible reason why teachers might lack motivation to consistently use peer feedback in higher education. Suggestions were made to first train teachers on peer feedback to help build knowledge and skills, and thus improve their motivation to implement peer feedback in their teaching.

This study aimed at discovering if a teacher training program on peer feedback can indeed improve teachers' motivation to implement peer feedback, and which elements of such a training are valued as useful to increase motivation. Therefore, a training program on peer feedback for technical university teachers was designed and executed, based on the Curricular Spiderweb of Van den Akker. Aim was to increase motivation by having teachers improve in feelings of competence, autonomy and relatedness, based on the Self-determination Theory of Deci and Ryan. Making use of convenient sampling, five teachers of University of Twente voluntary participated in both the training and the research. Pre- and posttest questionnaires and interviews were conducted and participants wrote a reflection report.

The qualitative analyses of this study showed that all participants increased in motivation to implement peer feedback because of the training, despite these participants already feeling enthusiastic beforehand. This study thus corroborates that training teachers on peer feedback can indeed increase motivation to implement peer feedback. This study also revealed that the chosen design elements, with focused on guiding participants from a scientifically substantiated perspective towards practical applicational and design choices, directly contributed to teachers' improvement in feelings of competence and autonomy. Relatedness was found to be valued highly as a contributor to improvements in feelings of competence and autonomy. Overall, this research showed that teacher motivation for implementing peer feedback can be improved by training technical university teachers on peer feedback, and that guiding those teachers from scientifically substantiated materials towards practical implementation is a solid approach to work on improvement of motivation.

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1 Problem Statement

Peer feedback in higher education has been found effective for student learning and for teaching. Students perform better when participating in peer feedback (Liu & Carless, 2006; Boud & Falchikov, 2007; Shute, 2008; Topping, 2009; Gielen et al., 2010; Van Zundert et al., 2010; Cho & Cho, 2011; Patchan et al., 2018; Sun et al., 2019). Teachers observing students in peer feedback activities provide the opportunity to detect common patterns. This yields for teachers a more accurate overview of students' performances which supports them to adjust their instructions to students' needs (Van Zundert et al., 2010; Ashenafi, 2017). In addition, having students participate in a peer feedback activity could diminish the time teachers have to spend on giving feedback themselves (Nicol et al., 2014; Sun et al., 2019; Cabello & Topping, 2020). Despite these benefits, peer feedback has not been widely implemented in higher education (Adachi et al., 2018). This might be caused by teachers not knowing how to implement peer feedback activities in their teaching adequately.

Firstly, teachers might lack knowledge on how to implement peer feedback to their teaching, and on peer feedback itself (Panadero & Brown, 2017; Zhao, 2018; Panadero & Alqassab, 2019). Secondly, teachers believe students may lack knowledge on peer feedback and on how to provide peers with feedback effectively (Panadero & Brown, 2017; Karakaya-Özyer, 2022). In addition, teachers reported their own lack of knowledge on peer feedback hinders them from training students on peer feedback effectively (CELT, 2015; Panadero & Brown, 2017; Zhao, 2018). Finally, teachers lack the motivation to implement peer feedback activities, because they expect that implementing peer feedback will initially require additional time and effort (Van den Berg et al, 2006; Wen et al., 2006; Panadero & Brown, 2017; Carless & Boud, 2018; Cabello & Topping, 2020).

Sluijsmans et al. (2002), Panadero & Brown (2017) and Ashenafi (2017) found that training teachers on peer feedback might reduce their anxiety and might motivate teachers to implement it. Training teachers on peer feedback (Sluijsmans et al., 2004; Panadero & Alqassab, 2019; Zhao, 2018) and providing knowledge and skills on the implementation of peer feedback could help further implementation of peer feedback in higher education. Since technical university teachers often have no educational background, training on peer feedback is even more relevant for this group. Technical university teachers typically do not receive extensive teacher training before they start to teach, they gradually gain knowledge and skills (Brouwer et al., 2022). Technical university teachers in the Netherlands are supported in their teaching through the obligatory University Teaching Qualification-trajectory. However, training on peer feedback and its implementation is not part of this trajectory (CELT, 2019). A separate peer feedback training for university teachers is thus recommended for effective implementation. This study aims to determine if training technical university teachers on peer feedback can improve their motivation to implement it. It also aims to determine which elements in such a training are considered valuable to improve motivation for peer feedback.

2 Theoretical Framework

2.1 Peer Feedback

2.1.1 Benefits of Peer Feedback for Students

Peer feedback is when peers provide each other with detailed informative or evaluative comments on the current state of a product (Liu & Carless, 2006; Van den Berg et al., 2009; Strijbos et al., 2010; Gielen et al., 2010; Patchan et al., 2018). In education, peer feedback could be used to offer students a chance to improve their product based on the feedback they receive, and on “correctives and information that reduces the gap between where students are and where they need to be” (Hattie, 2012, p. 129). This is a form of formative assessment which focusses on the learning process rather than on assessment (Liu & Carless, 2006).

Providing feedback proves to be even more impactful than receiving feedback from others, primarily due to the active role students have while participating in a peer feedback activity (Hattie & Timperley, 2007; Cho & Cho, 2011; Nicole et al., 2014). This participation enables students to actively steer their learning process, by critically assessing the work of their peers, and subsequently reflecting on how their own work aligns with these evaluations (Boud & Falchikov, 2006; Liu & Carless, 2006; Black & Wiliam, 1998; Hattie, 2012; Wanner & Palmer, 2018; Sun et al., 2019). Students could improve their product when receiving feedback on strengths and weaknesses, and practical suggestions to change certain parts (Boud & Falchikov, 2007; Gielen et al., 2010; Nicol et al., 2014). Especially, in relation to writing activities, which are quite common in universities, peer feedback could result in improved effectiveness and quality of learning (Cho, Schunn, & Charney, 2006; Topping, 2009; Patchan et al., 2018; Panadero & Alqassab, 2019). In summary, peer feedback offers students the opportunity to improve a given assignment and could result in improved effectiveness and quality of learning beyond the scope of an assignment.

2.1.2 Benefits of Peer Feedback for Teachers

Aforementioned improvements in overall learning for students could also have several benefits for teachers. Firstly, it could save teachers time when they do not have to provide all students with feedback themselves (Topping, 2009; Sun et al., 2019; Cabello & Topping, 2020). Secondly, teachers could get more insight into individual students’ contributions to a group project, if students are asked to give feedback on each individual’s performance during the creation of the group project (Cheng & Warren, 2000; Van Zundert et al., 2010).

Thirdly, teachers could get insights into how effective their teaching has been thus far, by determining the in-between progress of the students (Ashenafi, 2017). This progress can be found by looking at the given peer feedback. Teachers could subsequently use the gained insights to see which

shortcomings students might have and determine who needs additional supervision (Ashenafi, 2017; Cabello & Topping, 2020). Gained insights can also be used to create possible instructional revisions during a course (Guskey, 2002; Van Zundert et al., 2010; Cabello & Topping, 2020). In instructional revisions teachers could determine to explain certain content again or further, and could determine if additional learning materials would improve students' learning.

Fourthly, peer feedback could provide teachers with information on how clear previously determined assessment objectives and criteria are by checking which students are moving towards fulfilling the requirements and how the taught content did or did not contribute (Black & William, 2009; Hattie, 2012). Assessment criteria could also provide students scaffolds for providing peer feedback (Topping, 2009; Adachi et al., 2018). The use of scaffolds, either as guiding prompts or in the form of rubrics, could increase the effectiveness of the provided peer feedback (Topping, 2009; Gielen et al., 2010; Wang, 2014), and could result in better agreements between peer judgments and eventual teacher assessments (Falchikov & Goldfinch, 2000; Ashenafi, 2017).

Thus, peer feedback could save teachers time, offers teachers insights into their students' learning, and could lead to teachers being able to improve their instructions (Guskey, 2002). Peer feedback could also give teachers insights in how clear preset assessment criteria are. Understanding the benefits of peer feedback for both students and teachers could increase motivation in teachers to implement peer feedback in their education.

2.2 Teacher Motivation to Implement Peer Feedback

2.2.1 Motivation

Motivation can be viewed as an internal state of mind that helps individuals perform behavioral actions to reach previously set goals (Mayer, 2011). Motivation can be either intrinsic or extrinsic. Intrinsic motivation comes from the internal desire to learn or perform something, or from enjoying the action itself. In contrast, extrinsic motivation comes from an external source or purpose or from rewards (Gagné & Deci, 2005; Deci & Ryan, 2010). Deci and Ryan (2005) named a third aspect of motivation, namely amotivation, meaning a complete lack of motivation.

The transgression from amotivation through extrinsic motivation towards intrinsic motivation is called the Self-Determination Continuum (Deci & Ryan, 2005). The continuum names intrinsic motivation as a key aspect for people's performances, satisfaction, trust and well-being. This transgression can be supported through the process of Self-Determination Theory (SDT) (Deci & Ryan, 2000). Intrinsic motivation is said to result in deeper processing of learning, deeper understanding, and short- and long-term commitment, and can result in personal growth (Guskey, 2002; Vansteenkiste et al., 2006). Intrinsically motivated learners are more likely to be effective and successful (Deci & Ryan, 2000). Intrinsically motivated behavior is shaped by individuals' needs to feel

competent, autonomous, and related to others (Deci & Ryan, 2000, 2008; Thijs, 2011), as so described in SDT. SDT acknowledges the necessity of individuals having a feeling of control over and a sense of meaning in their lives. SDT is widely renowned, and states that personal growth can be achieved if the three universally recognized psychological needs of competence, autonomy and relatedness are seen to (Deci & Ryan, 2005).

Competence refers to people's need to experience they are competent enough to be effective in their daily life's activities, and that they can grow and develop (Deci & Ryan, 2000, 2008; Thijs, 2011; Martela & Riekkie, 2018; Ryan & Deci, 2020). Competence is best seen to in environments that hold optimal yet reachable challenges, and that can provide positive feedback (Ryan & Deci, 2020). Competence has three aspects that need to be considered, namely knowledge, skills and beliefs. Knowledge can be seen as the result of learning and remembering, being able to reproduce facts and concepts, and to possess information. Skills can be seen as an appropriate and effective way of using knowledge. Attitudes can be seen as views, patterns or tendencies people hold that can affect and alter behavior, and can be formed by either an individual or the environment in which that individual resides (Westera, 2001; Baartman & De Bruijn, 2011; Vitello et al., 2021). Effective use of knowledge and skills in a certain, often complex situation (Westera, 2001) could positively influence feelings of competence. Feelings of competence are also influenced by people's beliefs about other people, things, and experiences (Westera, 2001; Baartman & De Bruijn, 2011; Vitello et al., 2021). If the aspects knowledge, skills and beliefs are integrated and effectively applied to a situation, then people could experience feelings of competence.

Autonomy refers to people's need to have an own choice in decision making, and that those choices can be made independent of others' perceptions (Deci & Ryan, 2000, 2008; Thijs, 2011; Martela & Riekkie, 2018; Ryan & Deci, 2020). Autonomy is supported by internal feelings of value, and thwarted by external feelings of pressure. If people feel valued and can make own choices independent of others, then they could experience feelings of autonomy.

Relatedness refers to people's need to feel connected to others, experiencing different types of relationships with others, and feeling they belong to a group or a community (Deci & Ryan, 2000, 2008; Thijs, 2011; Martela & Riekkie, 2018; Ryan & Deci, 2020). Relatedness requires people to care about others and treat others respectfully. If people feel connected to others and are treated respectfully, then they could experience feelings of relatedness.

In summary, motivation can be experienced if feelings of competence, autonomy and relatedness are seen to. Experiencing competence can be obtained by performing actions that will let people feel knowledgeable and skilled, and feel their beliefs are accepted. Experiencing autonomy can be obtained by undertaking actions based on own made decisions. Experiencing relatedness can be obtained by treating people respectfully and by letting people feel supported in the actions they

undertake. If these three needs are met, then individual growth and development is possible. For the designing of a teacher training on peer feedback, it is thus important to see to these needs in relation to teacher motivation.

2.2.2 Teacher Motivation

In education, motivation is needed for teachers to become and stay committed to changed educational ideas. Teachers' motivation to change can be supported by letting teachers participate in teacher training programs, in which they can experience growth in their professional development (Guskey, 2002; Deci & Ryan, 2008; Maskit, 2011). New gained knowledge and skills through training could intrinsically motivate teachers in adapting and applying new knowledge and skills to their teaching (Collin & Smith, 2021). Experiencing successful implementations of changed educational practices could subsequently intrinsically motivate teachers to stay committed to the new approach (Gersten & Guskey, 1985; Guskey, 2002). Intrinsic motivation and commitment are important for continuously applying the changed practices, particularly once expertise support is withdrawn after training has ended (Timperley, 2008).

For a peer feedback training, SDT could be applied to look for improved and continuous motivation for peer feedback. Then, it is important to see to individual needs with regard to peer feedback teachers have, and to determine if these needs are met through a teacher training on peer feedback. Therefore, it is expected that if teachers feel they are becoming competent in peer feedback, being autonomous in choosing and constructing their own peer feedback activities, and experience relatedness to others that are supportive and help with the decision-making process, teachers' motivation to use peer feedback could improve. Seeing to these needs could increase motivation to use peer feedback. To obtain this, training teachers on peer feedback is recommended (Sluismans et al., 2004; Panadero & Alqassab, 2019; Zhao, 2018). Training teachers on peer feedback to increase motivation could be done by designing a training on the benefits and implications of peer feedback.

2.3 Increasing Teacher Motivation to Implement Peer Feedback through Training

2.3.1 Recommendations for Increasing Motivation through Training

Training programs for teachers on peer feedback could increase motivation to implement peer feedback in their teaching. In a few studies, the participating teachers indicated not feeling competent enough to adequately train their students on peer feedback, due to lack of knowledge and skills on how to provide such trainings (Sluismans et al., 2004; Panadero & Alqassab, 2019; Zhao,

2018). It is therefore advised to train teachers on peer feedback first, for them to be able to train their students on peer feedback (Sluijsmans et al., 2004; Gielen et al., 2010; Panadero & Brown, 2017; Zhao, 2018; CELT, 2019, Panadero & Alqassab, 2019). Training teachers could increase teachers' knowledge and skills (Collin & Smith, 2021), and confidence and competence, which could all contribute to increased motivation to implement peer feedback in their teaching (Zhao, 2018; Daumiller et al., 2021). Especially university teachers could benefit from receiving training themselves first (Brouwer et al, 2022), since they have had less training than teachers in primary and secondary education received (Panadero & Brown, 2017). Initial anxiety to implement peer feedback was seen to be reduced after teachers were trained (Sluijsmans, 2002), and reduced anxiety seemed to increase motivation to implement peer feedback (Zhao, 2018). Training could thus lead to teachers feeling prepared and more motivated to implement peer feedback in their teaching.

To increase motivation, feelings of competence, relatedness and autonomy should be addressed when designing a teacher training on peer feedback that aims to increase motivation for implementation. Incorporating factors that are shown to work in teacher training, and factors that are valued by teachers themselves are essential to aim for improved motivation.

For competence, teachers need to feel knowledgeable and skilled to implement peer feedback. It is therefore important to train teachers, because training programs help teachers build knowledge and skills, develop teaching techniques, and embed practices to their teaching (Guskey, 2002; Hunzicker, 2011; Collin & Smith, 2021). These reported gains can lead to improved motivation to implement what they have learned to their teaching (Coe et al., 2020; Collin & Smith, 2021).

For autonomy, teachers should experience both autonomy to choose if and how to apply peer feedback and the room to experience relatedness when building upon other teachers' beliefs and experiences. Motivation to implement peer feedback should hold room for a somewhat autonomous approach towards how to shape and implement peer feedback (Sluijsmans & Prins, 2006; Van den Berg et al., 2006; Topping, 2009).

For relatedness, teachers could develop through professional and personal experiences that teachers obtain and exchange with others on a daily basis (Guskey, 2000; Desimone, 2009; Maskit 2011; Sancar et al., 2021). These experiences could increase motivation for peer feedback if teachers can learn with each other about and from each other's experiences with peer feedback. Implementing room for teachers to exchange their experiences with and beliefs towards peer feedback (Desimone, 2009; Maskit, 2011; DeMonte, 2013; Daumiller et al., 2021) could thus contribute to improve motivation.

Seeing to the needs of competence, autonomy and relatedness could improve teachers' motivation to implement peer feedback. Implementation could lead to teachers experiencing more fulfillment and enjoyment of their work, and strengthen their long-term commitment to activities

like peer feedback (Deci & Ryan, 2000, 2008). Combining training content, to improve knowledge and skills, with individual and interpersonal experiences and beliefs is thus advised when training teachers on peer feedback. This requires a tailored training to be designed.

2.3.2 Recommendations for Teachers' Needs during Training

Aforementioned aspects to increase teacher motivation indicate what is known to work when training teachers. However, this does not immediately point out what teachers themselves value in training. Therefore, the training's design should also take into account what teachers perceive as valuable in training, and which design aspects of a training's design are considered valuable (Korthagen, 2017). People tend to perceive intrinsic and growth-oriented learning goals as valuable. These goals are said to be linked to experiencing satisfaction of basic psychological needs for experiencing competence, relatedness and autonomy, which are found in the Self-Determination Theory (Vansteenkiste et al., 2006). Shaping learning activities for teachers that focus on intrinsic and growth-oriented goals can promote deeper processing of the content and the offered learning materials, greater conceptual understanding of the content and materials, and short- and long-term persistence at implementing the learning content that was offered (Vansteenkiste et al., 2006; Klassen et al., 2012; Korthagen & Evelein, 2016). Teachers realize it is important to continuously improve their role as a teacher (Guskey, 2002; Desimone, 2009; Hunzicker, 2011; Pleschová et al., 2012; Sancar et al., 2021), and teachers who feel competent to teach are said to positively influence student achievement (Desimone, 2009; Kang et al., 2013; Sancar et al., 2021).

Besides intrinsic and growth-oriented learning goals, it is valuable to take the conditions that support and promote teacher growth, and the design process of the training into account (Korthagen, 2017; Sancar et al., 2021). Korthagen's and Sancar et al.'s research stated that teachers' individual characteristics, like needs, emotions and motivation, need to be considered when designing a training for teachers. Individual teacher characteristics will always weigh in to how effective the training will turn out for each individual teacher (Guskey, 1995). If teachers feel that the training offers opportunities for them to find their own beliefs reinforced and valued, their motivation is said to increase (Sancar et al., 2021). Teachers' perceptions of how they experience the training as a whole are also important, especially when looking for changes in beliefs about using the new content in their teaching (Gersten & Guskey, 1985; Morrison & Harms, 2018; Daumiller et al., 2021).

How teachers' characteristics, feelings and perceptions of training relate to the valuation of a specific peer feedback training is not yet clear. There has not been substantive research of what teachers consider valuable in a specific peer feedback training. Some suggestions were made in previous research. Panadero and Brown (2017) noted that teachers feel they lack training in

formative assessment, they stressed the need for teacher training on peer feedback to build competence in how to apply formative assessment. Panadero and Alqassab (2018) noted that teachers' beliefs about the effectiveness of peer feedback can be improved by training them on benefits. They mentioned that the level of teachers' domain knowledge can influence the degree to which a training will turn out effective. Zhao (2018) noted that teachers' confidence and feelings of competence to implement and use peer feedback will increase after training. He suggested to add group discussions and reflection to a peer feedback training to increase feelings of competence. These aforementioned features could contribute to teachers' increased motivation to implement peer feedback, since they align with the needs for competence, autonomy and relatedness listed in the Self-Determination Theory.

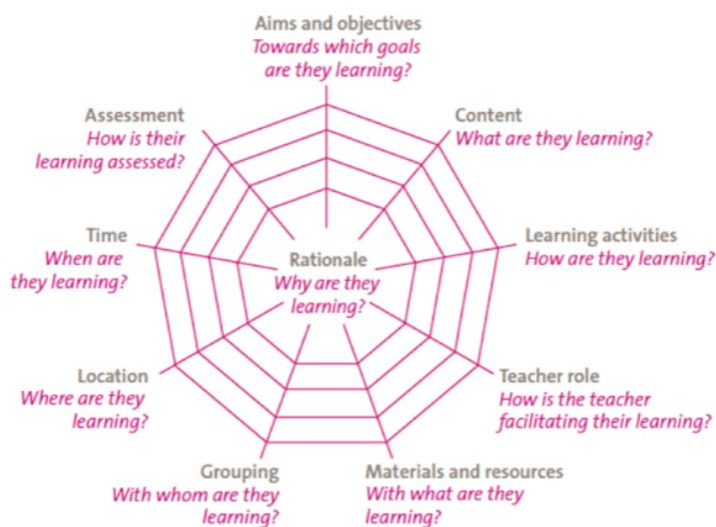
To offer teachers such a combined training on peer feedback, a holistic training approach, embedding learning in daily life and receiving practical applicable ideas, is advised (Guskey, 1985, 2002; Sluijsmans & Prins, 2006; Hunzicker, 2011; Cabello & Topping, 2020; Sancar et al., 2021). This aligns with McKenney and Reeves' (2019) views on Educational Design Research following a holistic approach, seeing aspects and processes of educational interventions as "integral phenomena" (Plomp, 2007, p. 16). A holistic approach in professional development for teachers could be shaped by combining professional and personal experiences, and relates to Desimone's (2009) advice on coherence in teacher trainings. Both personal and professional experiences are seen as key aspects when change in teacher behaviour is the aim of the professional development (Desimone, 2009; Maskit, 2011). A holistic approach ensures that different features of professional development, such as content on peer feedback, personal beliefs towards and experiences with peer feedback, sharing ideas with others, the content of the courses to be taught by teachers, the amount of time courses to be taught will take and the location where the courses will be taught, are not seen as stand-alone parts that need to all be separately addressed. Combining these features in trainings could increase motivation in learning (Hattie & Timperley, 2007; Strijbos et al., 2010; Wisniewski et al., 2020).

2.3.3 Recommendations for the Design of a Peer Feedback Training

Using a holistic approach for the design of a training allows for the different components of training to be interrelated to each other. Using Van den Akker's Curricular Spiderweb (2003) as a tool to design a training ensures all important aspects of education and their interconnectedness are taken into account (Figure 1). The core of the Spiderweb presents the rationale for learning, and the nine strings represent the aspects: aims and objectives, content, learning activities, teacher role, materials and resources, grouping, location, time, and assessment. Each string was designed based on what literature showed as important features to implement in the development of a training.

Figure 1

Van den Akker's Curricular Spiderweb (2003)



2.3.3.1 Rationale for Learning

The rationale for learning is meant to explain the reasons for offering learning. The phrasing of the rationale helps to consider which decisions should be made in the design of a training. A clear rationale strengthens the shaping of the other strings of the Spiderweb. Carliner (2015) mentioned the importance of training programs for adult learners to have meaningful goals, and addressing the gap between the current and desired performance of participants.

2.3.3.2 Aims and Objectives

Aims and objectives is meant to set the goals towards which participating teachers of a training are headed. These goals should be meaningful and aimed at learning, because learning goals that are directed at what learners hope to achieve were found to have a positive influence on learner engagement (Carliner, 2015; Daumiller et al., 2021). Such growth-oriented goals could promote deeper processing of a training's content and offered learning materials, greater conceptual understanding of the content and materials, and short- and long-term persistence at the learning activities offered (Vansteenkiste et al, 2006; Klassen et al., 2012; Korthagen & Evelein, 2016).

2.3.3.3 Content

Content refers to the actual content that is offered during a training. Content addresses the link between different activities used to provide the content of a training. Training content contributes when teachers gain concrete and practical ideas that relate directly to daily practices (Guskey, 2002; Hunzicker, 2011; Sancar et al., 2021). Additionally, it addresses how teachers'

improved knowledge and skills will lead to the shaping of how students will subsequently learn that content. Besides supporting knowledge and skills, giving room for changes in beliefs to take place within participants is also important. To provide the opportunity to change beliefs on the content of a training, the build-up of a training should be coherent. Coherence refers to the extent to which the content of a course is consistent with the current knowledge and beliefs of the participating teachers. Coherence contributes when teachers' learning is aligned with what teachers feel is needed in their teaching practices and which aspects of the training they could use while teaching (Guskey, 2002; Timperley, 2008).

2.3.3.4 Learning Activities

Learning activities can be seen as activities that are used within a training to help participants increase knowledge on and skills related to the offered content and to offer opportunities that could change beliefs about the content. If participants actively participate during these activities, this can be seen as active learning. Active learning addresses the need of a training's participants to be active while learning, by means of observations, discussions and interactions. Within teaching, active learning contributes when teachers can partially construct their learning themselves, since the more engaged teachers are, the more likely their learning will increase (Maskit, 2011; Korthagen, 2017; Daumiller et al., 2021).

2.3.3.5 Teacher Role

The teacher role represents the trainer that leads a training, and will be addressed as trainer from here on. The role of a trainer is somewhat different than a teacher role for teaching students is, because the participants that are being trained are teachers themselves (Lunenberg et al., 2014). Lunenberg stated that for training teachers, three things are considered important. Firstly, the trainer should be the provider of theoretical and tacit knowledge. Theoretical knowledge aims at giving theoretical understanding and proof of the content of a training. Tacit knowledge aims at providing teachers with information on experiences the trainer has encountered with the theory, the content, and the practical application of the content. Tacit knowledge can be provided by telling about the experiences and by modelling how the experiences played out.

Secondly, the trainer should be the promotor of active and self-regulated learning. Active learning by teachers is important because it provides teachers opportunities to master theory and content themselves, and could lead to more self-regulated learning in which teachers become the initiators of their own learning. The importance of self-regulated learning is mentioned by Timperley (2012), who stated that self-regulatory skills are amongst the most powerful contributors towards ongoing teacher development. Having teachers experience active and self-regulated learning has an

additional benefit. If teachers experience the usefulness of active and self-regulated learning themselves, they could more easily promote active and self-regulative learning within their own students. Active and self-regulated learning play a pivotal role in student engagement towards actively working on a task or product (Sun & Wang, 2022; Zhang & Hyland, 2022). This could engage students to participate in a peer feedback activity.

Thirdly, the trainer should keep in mind possible tensions and dilemmas teachers may have. Tensions and dilemmas could relate to time restraints they have to work on implementing the content of the training, or on the actual implementation of the content to their teaching practices. It could also relate to the difference between the willingness to implement the content and the actual capability of implementing this content. Another aspect of a tension or dilemma could be that teachers might experience uncertainty when faced with the implementation of new content, if it steers away from their already established approach of teaching. The trainer should find a balance between acknowledging tensions and dilemmas teachers might experience during training, and help teachers overcome these tensions and dilemmas. Overcoming tensions and dilemmas could improve the motivation of teachers to implement a peer feedback activity to their teaching situation.

2.3.3.6 Materials and Resources

Materials and resources that are used in a training should be supportive of learning. Training materials and resources can be used as preparation for training sessions or to guide learning during the sessions. Training materials and resources should focus on the building of knowledge and skills or focus on strengthening beliefs. If materials and resources support the offered content and support the learning goal of a training, this could contribute to deeper learning (Vansteenkiste et al, 2006; Klassen et al., 2012; Korthagen & Evelein, 2016).

2.3.3.7 Grouping

Grouping participants in a training setting can be seen as an effective way to enable teacher development, both for processing the content to improve knowledge and skills, and for sharing and testing own beliefs. Learning with others is an effective way for teachers to develop new knowledge and skills, and could contribute to changing current teaching practices into new practices (Clarke & Hollingsworth, 2002; Desimone, 2003, 2009; Hunzicker, 2011; Clavert et al., 2015; Sancar et al., 2021). Teachers prefer learning with colleagues from the same educational institution, because this offers easier opportunities for peer support after the training has ended (Hunzicker et al., 2011; Clavert et al., 2015). Learning with others is best done in groups that have a smaller amount of participants, which leaves room for taking teachers' ideas about what they want to learn into

account during the training and enable the trainer to provide a somewhat personal approach (Korthagen, 2017; Brouwer et al., 2022).

2.3.3.8 Location

The location where teacher training programs should take place are not often specifically defined. Van den Akker (2013) pointed out to consider the location as the actual room in which training takes place. He opted to also consider the social and physical characteristics that room could provide. Kneale et al. (2016) mentioned that teachers consider the distance between their own location and the location of the training as an indicator for teachers to consider following a training. In-house training was suggested as a good fit to offer opportunities for local-oriented problems related to the content of the training to be addressed during the training (Popova et al., 2016).

2.3.3.9 Time

The amount of time a training should have should be carefully considered. Teachers are said to be limited in the time they can spend on training, due to other tasks at work (Guskey, 2002; Clavert et al., 2015; Sims et al., 2021; Brouwer et al., 2022). Teachers were pointed out to have more focus, stamina and retention of training content in shorter trainings (Scott, 2003; Daumiller et al., 2021).

2.3.3.10 Assessment

The assessment of the learning of teachers in a training should support teachers' learning and commitment to the offered content. This can be achieved through means of reflection on their learning. Reflection on learning can help teachers direct their own growth trajectory when focus lies on conscious thinking about experiences they encountered and actions they took (Boud et al., 1985; Korthagen, 2015). This way, teachers can expand their understanding and knowledge of and skills in the content that is delivered in the training.

2.4 Research Questions

This study's goal is to determine if technical university teachers' motivation to implement peer feedback can be improved by training them on peer feedback, and how such a training should be designed. Therefore the first research question for this study was: *'what is the influence of a training program on technical university teachers' motivation to implement peer feedback?'*. The second research question was: *'which elements of a peer feedback training are considered valuable by technical university teachers to increase motivation to implement peer feedback activities?'*.

3 Research Design and Methods

This study had an exploratory design, in which primary and secondary methods were used. Primary methods consisted of a questionnaire before and after the training, the training being the intervention of this research. Additionally, reflection reports participants of the training wrote afterwards, and interviews held with participants after the training had ended were used. Secondary methods consisted of online research on training methods, and a literature review on peer feedback, motivation, training teachers, and educational design.

3.1 Participants

Participants needed to be teachers at a technical university, in this research teachers from University of Twente were sought. Participants were sought through means of convenient sampling. Educational specialists of University of Twente advertised the combined research study and training to teachers in their own faculty, after which interested teachers could sign up via the university's website for courses and training programs. Six participants participated in the training of whom five also participated in the research. Of this five participants, three identified as female, one as male, and one did not disclose gender. Age ranged between 25 and 64. The smaller sample allowed for a more personal approach during the training and allowed for a qualitative analysis of both reflection reports and interviews with all participants of the research.

3.2 Materials and Instrumentation

The materials used for this research consisted of a specifically designed training on peer feedback and a specifically designed online environment for participants. In this online environment, participants could find relevant information, articles and materials used during the training, and the instrumentation necessary for the research. The instrumentation used for this research consisted of specifically designed pre- and posttest questionnaires, a reflection report and interview questions.

3.2.1 Training

The aforementioned valuable features of teacher training and teachers' needs in training were used for the build-up of the teacher training on peer feedback. For this, the Curricular Spiderweb was chosen as a tool to ensure all important aspects of education and their interconnectedness were taking into account. Each string was designed based on what literature showed as important elements to implement in the design of a peer feedback training.

3.2.1.1 Rationale for Learning

For a peer feedback training the rationale is to have participating teachers become more motivated to implement peer feedback activities to their teaching after the training. This could be achieved by letting teachers gain knowledge about and skills in peer feedback to help positively strengthen or change their current beliefs about implementing peer feedback.

3.2.1.2 Aims and Objectives

For a peer feedback training aims and objectives should give information on peer feedback substantiated by both literature and practical experiences. This could help participants of the training get an overview of what peer feedback could add to their teaching, what requirements need to be in place to create and implement a peer feedback activity, and what individual choices in the design of a peer feedback activity participants could make. This was directed by focusing on improving feelings of competence, autonomy and relatedness. Feelings of competence were constructed by building knowledge and skills, and by positively improving or reinforcing beliefs towards peer feedback. This building was structured by starting with theoretical substantiated materials, and subsequently moving towards practical implications and design choices. Feelings of autonomy were constructed by consistently focusing on the individual options to choose for implementation of peer feedback and design choices to determine to which extent and how peer feedback could be individually implemented. Feelings of relatedness were constructed by having participants work and learn together, by sharing beliefs and ideas, and by learning from other's experiences with peer feedback.

3.2.1.3 Content

For a peer feedback training, content should provide two relevant aspects. Firstly, relevant information on feedback and secondly, relevant information on peer feedback should be discussed and reviewed. Relevant information on feedback consisted of discussing the levels and types of feedback (Hattie, 2012), which teachers could use as focus points during a peer feedback activity. Hattie found that teachers and students do not always perceive feedback similarly. Teachers more often see feedback as useful if it provides comments and correctives on what has been shown. Students more often see feedback as useful if feedback looks forward to how things can be improved and if it is about the work and not the student. Therefore, incorporating information on both levels and types of feedback would be of value. Levels of feedback distinguish between task level, process level, self-regulation level and self-level. Task level feedback provides information on the task or product itself, and leads to the acquiring of more and different information. Process level feedback provides information on the process in which the task or product was created, and lead to different approaching in learning, developing and creating a task of product. Self-regulation level feedback

provides information on how someone monitors their own learning process, and can increase someone's skills to self-evaluate, confidence, and acceptance of feedback. Types of feedback distinguish between disconfirmation or confirmation of a task or product, and distinguishes between the intention with which feedback is given, to look back, to look at the current state, or to look forward.

Relevant information on peer feedback consisted of benefits of peer feedback, and practical aspects of peer feedback. Participants were introduced to concrete benefits of peer feedback by showing successful examples of peer feedback. Participants were asked to share their own beliefs and ideas about peer feedback, to allow teachers to choose the best fit from the examples and ideas given for their own teaching situation when designing a peer feedback activity. These considerations would help improve feelings of competence and autonomy. Additionally, sharing beliefs and ideas offered opportunities to work and learn together, which helped improve feelings of relatedness.

Practical aspects of peer feedback were offered by discussing five different aspects that needed to be considered for the design of a peer feedback activity. Firstly, specific aspects of peer feedback aimed at determining how a peer feedback activity could be shaped were reviewed. Pros and cons were discussed on whether a peer feedback activity should be anonymous or relatable, voluntary or non-voluntary, online or offline, task-based or behaviour-based, and in dyads or small groups of students (Topping, 2009; CELT, 2015; Cabello & Topping, 2020). Secondly, specific aspects of peer feedback aimed at the differences between giving and receiving peer feedback were reviewed. Thirdly, specific aspects of peer feedback aimed at what type of work or product peers needed to provide feedback on, like oral presentations, written products, or behaviour were reviewed (Topping, 2009; Cabello & Topping, 2020; Ellegaard et al., 2022). Fourthly, specific aspects of peer feedback aimed at the sort of peer feedback that should be given, like identifying problems, suggesting improvements, localizing problem areas, or praising positive aspects were reviewed (Nelson & Schunn, 2009; Cho & MacArthur, 2010; Patchan et al., 2016). Fifthly, the possibility of using rubrics and different types of rubrics to use to help guide a peer feedback activity were reviewed (Sluijsmans & Prins, 2006; Cabello & Topping, 2020).

After each aspect was dealt with during the intervention, participants were asked to determine how each aspect would best fit their desired peer feedback activity. They listed their choices in a so-called "Initial draft plan". This draft plan could serve as a starting point for creating an own peer feedback activity. After the training had ended, all participants had a finished initial draft plan with all relevant choices applicable to their own teaching situation. Creating this plan had participants actively work on and with the content of the training. This active learning could help them become more motivated to implement peer feedback.

3.2.1.4 Learning Activities

For a peer feedback training, different types of learning activities will allow teachers to process the information and make individual choices on how peer feedback could be designed to suit their teaching practices. Within the training, focus lay on activities that would spark individual thinking processes and would have participants determine how the given information could be applied to their own teaching situation. The chosen activities included individual thinking, small and larger group discussions, weighing and choosing the best individual fit out of two or more options, Buzz group-discussions, think-pair-share, T-shaped models, and the watching of and reflecting on a video (Bijkerk & Van der Heide, 2006; Dirkse-Hulscher & Talen, 2007; Statewide Training and Development Services, 2007).

3.2.1.5 Teacher Role

For a peer feedback training, the teacher role was that of a trainer of teachers. The trainer should share theoretical and tacit knowledge on peer feedback, promote active and self-regulated learning, and address possible tensions and dilemmas participants might have about peer feedback. This helps guide teachers in developing competence, relatedness and autonomy to become motivated to implement peer feedback. The trainer was also the designer of the training and the researcher of this study. Within the training, this allowed the trainer to share theoretical knowledge on peer feedback and tacit knowledge on applications of peer feedback activities in education. The trainer supported active learning by shaping the learning activities in a way that enabled participants to continuously actively process the content. The trainer supported self-regulated learning by guiding the transition from theoretical information to practical ideas. This was done by the trainer by guiding the steps participants took while creating an initial draft plan.

3.2.1.6 Materials and Resources

For a peer feedback training, using literature based information for a training, displaying scientifically approved and relevant background information, helps to support both teachers' knowledge about and beliefs towards peer feedback. Using practical materials on how to apply peer feedback, will help build skills to implement peer feedback. These skills could contribute to improving motivation. Within the training, materials and resources were selected both as preparation and as guidance learning during the sessions. To read as preparation, a teacher factsheet on peer feedback (Brincker et al., 2019) (Appendix 1), and two articles by Topping (2005), and Lam (2010) were uploaded to an online environment.

During the sessions, multiple quotes were used to prompt participants to think about which requirements, like preparation and student guidance, need to be in place to design a peer feedback

activity for their own teaching situation (Schomberg, 1986; Boud, 1990; Van Merriënboer, 1997; Cheng & Warren, 1997; Hanrahan & Isaacs, 2001; Woolhouse, 2006). An example is “Peer learning works better for some students than for others, but learning is increased for most students and doesn’t hurt the learning of others. Peer learning has the advantage of interaction with a peer, an opportunity for mutual support and stimulation. It is named to reduce absenteeism” (Schomberg, 1986). Example rubrics from Auckland University and Onlineteaching.com were used to showcase different types of rubrics participants could use to guide students when giving peer feedback. A video on the TAG-method from Henderson (2014), which shows to ‘Tell something good’ (T), ‘Ask a question’ (A) and ‘Give a suggestion’ (G) as means to guide students when giving feedback was shown to showcase an example of how to provide guidance. The four-step procedure, ‘clarifying, identifying, explaining and offering suggestions’ from Lam (2010) was also discussed as an alternative way of guiding students when asking them to give peer feedback. Cabello and Topping’s ‘Implementation cycle’ (2020) was used to showcase the order in which participants would need to prepare, design and put in place all steps to design and implement a peer feedback activity. The implementation cycle shows six steps, ‘setting the groups, setting assessment criteria, applying assessment criteria, preparing the task to be assessed, assessing the task, and evaluating the assessment of the task’. The cycle has an iterative process in which participants can adjust a designed peer feedback activity after its first run is completed, if necessary. This provided the participants with an approach to be used to continue implementing peer feedback after the training had ended.

3.2.1.7 Grouping

For a peer feedback training, sharing ideas about and insights on how to implement peer feedback with colleagues can increase both knowledge and skills, as well as motivation to use peer feedback. Within the training, ideas and insights were shared with the other participants and the trainer. Interaction with the trainer could be done immediately, which was specified at and repeated throughout both sessions. Interaction with the other participants was incorporated into both sessions within the activities that participants were asked to do. The activities chosen accommodated individual thinking processes, but with the necessity to discuss these processes with other participants. Activities were also designed to accommodate the forming of different pairing or grouping of participants per activity, to ensure the widest array of collective participation possible. The amount of participants was restricted to twelve per training run. Grouping was set to be of a voluntary nature to ensure all participants were willing to be trained on the common goal of peer feedback.

3.2.1.8 Location

For a peer feedback training, having a location that offers room for active processing of the content and for sharing ideas and views with others, and that is nearby the actual workplace is therefore advised. Within the training, a location on campus was chosen to have the training nearby the own workplace. A room was chosen that enabled active processing of the content and for sharing ideas and views with others.

3.2.1.9 Time

For a peer feedback training, designing a shorter training could be the best approach. Findings indicate that shorter trainings can be just as effective, as long as there is an option to host multiple sessions, since more than one session is said to have a positive impact on training outcomes (Guskey, 2002; Hunzicker, 2011; Daumiller et al., 2021). This approach also does justice to the limited time teachers might be willing to spend. The amount of time for the training was chosen to be divided in two sessions of two hours. This enabled all chosen content, activities and reflective moments, as well as the creating of notes and the initial draft plan to be incorporated. Sessions were hosted on same days, with a two week period in between both sessions. By having two sessions, teachers' limited amount of time was taken into account, while still applying scientifically validated ideas of having more than one session, and of the effectiveness shorter courses can have on focus, stamina and retention of participants.

3.2.1.10 Assessment

For a peer feedback training, adding reflection on learning was mentioned by Zhao (2018) as a method to increase participants' feelings of competence and confidence in implementing peer feedback to their teaching. Guiding that reflection process is advised, preferably by means of writing experiences and ideas down (Walker, 1985; Seibert, 1999; Rosier, 2001). Reflection could thus be assessed by means of a reflection report. For this training, a guided reflection report on what was learned and on how participants viewed the implementation of peer feedback was designed. The guidance was offered by structuring guiding questions within the reflection report. For this, the ALACT-cycle of reflection (Korthagen, 1985) was used. ALACT stands for: focusing on action (A), looking back on action (L), awareness of essential aspects (A), creating alternative methods of action (C), and trying out new actions (T). Focusing on action was incorporated by reflecting on upon initial and current perceptions towards peer feedback. Looking back on action was incorporated by reflecting on how the perception towards peer feedback might have changed. Awareness of essential aspects was incorporated by reflecting on awareness of changes in skills, knowledge, and insights. Creating alternative methods of action was incorporated by reflecting on which changes in skills,

knowledge and insights could be applied to their teaching situation. Trying out new actions was incorporated by reflecting on which elements and content of the training participants could use when designing and implementing a peer feedback activity. Besides evaluating whether the training on peer feedback changed their beliefs about using and improved their motivation to use peer feedback after the training, the report also served as an additional implementation tool. Participants could use this reflection on the training to further develop their initial draft plan when designing a peer feedback activity and implementing peer feedback to their teaching situation.

3.2.2 Instrumentation and Data Collection

For this study, several instruments were created and used for data collection. Some quantitative data was collected, which was collected first. Quantitative data consisted of a pre- and posttest questionnaire. Most data consisted of qualitative data, which was collected secondly. Qualitative data consisted of reflection reports and interview questions.

To answer research question one: *'what is the influence of a training program on technical university teachers' motivation to implement peer feedback to their teaching?'*, the questionnaires and reflection reports were used. Firstly, a pre- and post-test questionnaire was developed and administered, with a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaires (Appendices 2 and 3) consisted of 23 questions, dividing into subtopics on competence (9 questions), relatedness (7) and autonomy (7). The questionnaire was an adapted version of two existing instruments, the Intrinsic Motivation Inventory (Ryan & Deci, 2000) and a not yet published questionnaire on experiencing peer feedback (Pereira, 2024). The questionnaires' overall theme related to SDT. Questions were randomly divided amongst the questionnaire. By asking participants before and after the training, these data could help determine the influence the training had on improved motivation (InterQ Research, n.d.).

Participants were asked to rate how knowledgeable and skilled they felt towards peer feedback, and which beliefs they held about peer feedback, these three aspects are all related to SDT's competence. An example question on competence was 'I feel competent enough to implement peer feedback'. Participants were also asked about how autonomous they thought they could be when deciding upon using peer feedback and on shaping an own peer feedback activity, both related to SDT's autonomy. An example question on autonomy was 'I need this training because I have to implement peer feedback in my teaching'. Lastly, participants were asked how they felt about learning from and with others, related to SDT's relatedness. An example question on relatedness was 'I like a chance to interact with my peers'.

Secondly, a reflection report was administered (Appendix 4). The reflection report had five guiding questions for reflection based on the ALACT-model, and a sixth question on overall

motivation. The first question aimed at Action (A) and was posed as 'What did you initially think about peer feedback? What do you think of it now?'. The second questions aimed at Looking back on action (L) and was posed as 'How did your perception towards peer feedback change during and after the training?'. The third question aimed at Becoming Aware of action (A) and was posed as 'What new insights, skills or knowledge did you gain during the training?'. The fourth question aimed at Creating alternative solutions (C) and was posed as 'Which of those skills are applicable to your specific teaching situation?'. The fifth question aimed at Trying alternative actions (T) and was posed as 'What basic elements would a peer feedback activity entail in your specific teaching situation?'.

To answer research question two: *'which elements of a peer feedback training are considered valuable by technical university teachers to increase motivation to implement peer feedback activities?'*, interviews with participants were used. Participants were asked about their experiences towards the content of the training, and on how this could have contributed to their improved motivation towards peer feedback. A semi-structured approach was chosen to ensure all relevant aspects for collecting data were addressed, while having the opportunity to ask deepening and/or elaborative questions. The interview was conducted via Teams, to enable transcription running simultaneously.

Twenty-three interview questions (Appendix 5) were created to gain insights into how participants experienced the training and into how the training contributed to participants' perspectives towards improved motivation to implement peer feedback. Questions were designed to address all nine strings of the Curricular Spiderweb. Distinctions between the strings were made by creating subparts, with questions on offered content (4), offered activity types (6), time spent on the training (5), opportunities for an individual approach (3), and opportunities to apply content to the own situation (5). Also, two stand-alone questions were created, on the location of the training, and the grouping of participants during training. An example question on content was 'What content did you find valuable? Why?'. An example question on activity types was 'Which activities contributed to your understanding? Why?'. An example question on time spent in the training was 'How do you value the time between both sessions?'. An example question on opportunities for a personal approach was 'How well were you able to seek additional help/input to make the content applicable to your situation?'. An example question on opportunities to apply content to the own situation was 'How well did the creation of a draft plan help you thinking of applying peer feedback to your situation?'. The question on location was formulated as 'What did you think about the location of the training?'. The question on grouping was formulated as 'How did you value learning with peers?'.

3.3 Procedure

The researcher of this study was also the trainer during the sessions and the interviewer. Before the intervention started, approval for this research was obtained from the ethical committee of the Faculty of Behavioural, Management and Social Sciences of University of Twente. Participants received a consent form with information about the study alongside the pretest questionnaire. Participants could participate in the training, but not the research. Participants were given a number with which the data collection was carried out, to be able to match pre- and posttest questionnaires' values. This offered a pseudo-anonymous approach for the data analysis. Two weeks before the first session would be offered, participants were invited to fill out the pretest questionnaire. Two weeks after the first session occurred, the second session was offered. At the end of this second session, time was set aside for participants to fill out the posttest questionnaire. Filling out each questionnaire would take approximately ten minutes. At the end of the second session all participants that agreed to be part of the research were asked to also participate in an interview. The time for the interview was set to be between thirty and forty-five minutes. The participants also needed to hand in their reflection report. This was set to be done after the second session and within a two weeks-timeframe. Writing the reflection report would take approximately twenty to thirty minutes.

3.4 Data Analysis

The data found in the questionnaires was processed by using the statistical software programme SPSS. The pre- and posttest questionnaires were used to look for initial trends in the possible influence of a training on increased feelings of competence, autonomy and relatedness, and on a possible increase in overall motivation for using peer feedback. The trends were compared to the results of the reflection reports. These reports were analyzed by using Atlas.ti. The interviews were also analyzed by using Atlas.ti.

3.4.1 Reflection Reports

For the reflection reports a predetermined codebook was created, and all documents were coded by using the codes from that codebook. The codes, six in total, were grouped into themes defined by the SDT-components, and were: knowledge (competence), skills (competence), beliefs (competence), autonomy, relatedness, and motivation (Table 1). The coding of the reports was used to look for improvements of all the components, and to compare to the analyzed questionnaires.

Table 1
Data coding structure for reflection reports

Thematic codes	Second-order codes	Example code
Competence	Knowledge on peer feedback	My knowledge about peer feedback became enriched by awareness of levels, purposes and implementation considerations.
	Skills in peer feedback	I am more confident to actually apply it (peer feedback) in a good way, such that students also are positively affected and learn from it.
	Beliefs towards peer feedback	I believe that peer feedback is a useful tool when it is done correctly.
Autonomy	Own choice to implement peer feedback	I would like to only use peer feedback and not focus on peer assessment (peers grading each other).
	Own choice to create own peer feedback activity	For me this was a very practical way to get a lot of theory but also immediately be able to think about what would work in my classroom and what I need to prepare.
Relatedness	Experiencing learning with peers	These many perspectives (of other participants) makes it easier for me to see what I can and cannot hope to achieve by applying this method.
	Experiencing learning from the trainer	It was nice you (the trainer) gave ample opportunity for us to bring in own experiences and questions.

3.4.2 Interviews

For the interviews, a separate predetermined codebook was created, and all documents were coded by using the codes from that codebook. The codes, nine in total, were grouped into themes defined by the Curricular Spider Web components, and were: aims and objectives, assessment, content, grouping, learning activities, location, materials and resources, teacher role, and time (Table 2). Distinctions within the code Materials and Resources were made to be able to distinguish between materials used as preparation for and within the training. The coding of the interviews was used to look for valuable elements of the designed peer feedback training.

Table 2*Data coding structure for interviews*

Thematic codes	Meaning of codes	Example code
Aims and objectives	Desired outcomes of training	It is very wise to follow a training on peer feedback to learn more about it. To learn how to organize and execute it, to make sure it actually works out.
Content	Information on peer feedback	It is nice to know from literature that peer feedback can be just as effective as teacher feedback, if it is given by three to five different feedback givers.
Learning activities	Activities used during training	What I really enjoyed was the amount of interaction with each other. It really was like an interaction party. That just really made me happy participating.
Teacher role	Person giving training	The experience you (the trainer) bring is really nice for us. You come up with many examples that you just seem to pull off the top of your head. That is really fun and valuable
Materials and resources	Materials and resources used as preparation	Online I have the opportunity to get back to all materials even after a longer period of time, whenever I wish to.
	Materials and resources used during training	I am visually oriented, so normally I will make notes and draw images myself. It was really nice that you (the trainer) did this for us, so I could participate more actively.
Grouping	Learning together with peers during training	To hear what my peers did, and how, and what they wouldn't do, that was really helpful. Especially for me, because I am relatively new to this as well.
Location	Place training took place	No online teaching, please.
Time	Amount of time totally spent on training	As long as I get valuable input, I do not mind the amount of time it takes.
Assessment	Assignments needed to round off training	-

3.4.3 Intercoder Reliability

To ensure all data was coded correctly, a second coder with the same educational background, coded forty percent of the reflection reports and twenty percent of the interviews. The second coder was handed the codebooks beforehand. Intercoder reliability was measured for the reflection reports, interviews and the overall coding of the documents by the use of Krippendorff's alpha. For the reflection reports, Krippendorff's alpha binary coefficient was calculated at $\alpha = .896$. For the interviews, Krippendorff's alpha binary coefficient was calculated at $\alpha = .855$. For the overall coding of the documents, Krippendorff's alpha coefficient was calculated at $\alpha = .882$.

4 Results

The aforementioned data was used to answer the research questions. Firstly, the results of the questionnaires and reflection reports will be given. These data types belong to research question one. Secondly, the results of the interviews will be given. This data type belongs to research question two.

4.1 Research Question One

To answer research question one: *'what is the influence of a training program on technical university teachers' motivation to implement peer feedback to their teaching?'*, pre- and posttest questionnaires were compared with reflection reports. The results of the questionnaires were used to determine means and standard deviations between participants' pre- and posttest, and between groups' pre- and posttest. The difference between pre- and posttest results per component were compared to the results per component found in the reflection reports. In the reflection reports, competence, autonomy and relatedness were all mentioned by all participants (Table 3). First, results will be given per competence. Thereafter, results of overall motivation will be given.

Table 3

Amount of codes used in reflection reports

Thematic codes	Meaning of codes	Amount
Competence	Knowledge on peer feedback	30
	Skills in peer feedback	15
	Beliefs towards peer feedback	22
Autonomy	Own choice to implement peer feedback	7
	Own choice to create own peer feedback activity	13
Relatedness	Experiencing learning with peers	3
	Experiencing learning from the trainer	0

4.1.1 Competence

In the questionnaires, an increase in competence was found for all participants (pretest $M = 3.67$, $SD = .41$, posttest $M = 4.63$, $SD = .24$). This increase in feelings of competence was also found for all participants in the reflection reports. One participant mentioned: "I feel more positive as I know now what to do and how to do it. It is exciting to me to get started with it". Related to the knowledge-aspect of competence, in the reflection reports all participants increased in knowledge. Participants indicated that this increased knowledge positively contributed to their motivation to implement peer feedback. One participant mentioned: "My knowledge about peer feedback became enriched by awareness of feedback levels, purposes and implementation considerations". Overall, participants mentioned three factors as contributing to improved knowledge. Firstly, addressing feedback as a separate part during the training was mentioned by all as contributing. All participants indicated that they were unaware of the existence of different levels of feedback, and of different types of feedback. Knowing about this was deemed helpful when making choices on how to design an own peer feedback activity. Secondly, knowing the benefits of peer feedback was mentioned as contributing to improved knowledge. Four participants indicated they felt more knowledgeable about the benefits after the course, and that this contributed to their motivation to use peer feedback. Especially, the scientific substantiating used during the training made participants feel more supported to implement peer feedback. Thirdly, implementation considerations were mentioned by most participants as contributing. Knowing which type of peer feedback activity to choose and what is needed to prepare and implement that activity was mentioned as contributing to improved motivation.

Related to the skills-aspect of competence, in the reflection reports participants were shown to have increased in their skills in making choices when designing a peer feedback activity, but did not increase in their skills to fully implement such an activity. The increase in making choices when designing an activity was found in the reflection reports because of three contributing factors. Firstly, participants valued knowing that length and focus points of peer feedback activities can all be individually designed. One participant said: "I feel that I am more confident to actually apply peer feedback in a good way, in such a way that students also are positively affected by and learn from it". Secondly, four participants mentioned their skills in preparing students for peer feedback increased. The information about students not always being familiar with providing feedback in general, and to peers, was new to three participants. All participants mentioned considering to incorporate time to explain to students how to provide and receive feedback in a constructive and supportive manner. Thirdly, participants perceived they were better capable of designing an activity that can be feasibly executed, and supports student learning. Three participants mentioned that throughout the training

they realized that a good and thorough preparation is needed to design a successful peer feedback activity that will also be appreciated by students.

Though participants felt their skills in designing an activity increased, they felt less skilled in fully implementing peer feedback. In the reflection reports, most participants indicated needing more guidance and time to reflect upon their designed peer feedback activity. All participants suggested to add more time to the training, in which they could further improve in implementation skills. Suggestions were made to add review of and feedback on an own designed activity to the training. However, participants indicated that their need for review and feedback did not diminish their motivation to implement peer feedback. The responses suggested that what they gained in skills contributed more to them feeling knowledgeable and skilled in designing an activity than actually implementing a peer feedback activity.

Related to the beliefs-aspects of competence, four out of five participants mentioned an increase in beliefs towards peer feedback because of training in their reflection reports, though this increase was less substantive than increases in knowledge and skills. This seemed to be caused by participants pointing out in their pretest questionnaire that they already felt positive towards implementing peer feedback before the training commenced. The voluntary setup of participating in the training already suggested this. Participants mainly found themselves acknowledged in their prior thoughts; strengthening their beliefs towards implementing peer feedback. A participant pointed out: "This training widened my perspective on peer feedback and consolidated my enthusiasm and motivation for applying eduScrum [peer feedback tool]".

Overall, participants found their knowledge about the relevance, the scientific substantiations and the practical implications for implementing peer feedback increased during training. This increased knowledge positively contributed to improved motivation to implement peer feedback. Participants indicated that their skills had increased enough to positively contribute to improved motivation for implementing peer feedback. And they found their beliefs towards implementing peer feedback improved due to the insights participants gained. Because of these factors, and the increase in the questionnaires, overall competence was found contributing to improved motivation to implement peer feedback.

4.1.2 Autonomy

In the questionnaires, an increase in autonomy was found for all participants (pretest $M = 4.45$, $SD = .37$, posttest $M = 4.95$, $SD = .11$). This increase in feelings of autonomy was also found for all participants in the reflection reports, regarding the autonomy to choose how to design a peer feedback activity. One participant mentioned: "For me this was a very practical way to immediately think about what would work in my classroom and what I need to prepare". Related to this, all

participants indicated to better understand they have an autonomous choice in how to design an activity. Four participants indicated that the training increased their understanding of all features peer feedback could entail, which would help them make solid choices that would best fit their teaching situation. They reported that being aware of and able to make those choices increased feelings of autonomy. One participant said: "For me this was a very practical way to get a lot of theory but also immediately be able to think about what would work in my classroom and what I need to prepare". Regarding the autonomy to choose whether or not to implement peer feedback, no specific comments on increase were made. All participants did indicate that they saw their prior feelings towards implementing peer feedback supported by what they learned. They all also felt more autonomous to design an activity that best suits their teaching situation. Overall, this increase in autonomy can be seen as contributing to improved motivation to implement peer feedback.

4.1.3 Relatedness

In the questionnaires, an increase in relatedness was found for all participants (pretest $M = 4.65$, $SD = .28$, posttest $M = 5.00$, $SD = .00$). This increase in feelings of relatedness was also found for all participants in the reflection reports. One participant mentioned: "The many perspectives of others made it easier for me to see what I can and cannot hope to achieve by applying peer feedback". Feelings of relatedness were not reported that often in the reflection reports. Almost all comments made regarded the relationship participants had with the other participants. All participants valued learning with and from others, especially regarding others' perspectives towards and experiences with peer feedback. Firstly, perspectives were indicated to widen the understanding of which design features could be used in a specific teaching situation. Secondly, that widened understanding was also reported in relation to learning from others' experiences. Two participants indicated they already used peer feedback before the training. Their sharing of experiences with contributing and hindering factors that occurred during their activities was often mentioned as helpful. One participant wrote: "The many perspectives of other participants made it easier for me to see what I can and cannot hope to achieve by applying peer feedback." Some comments made, regarded the relationship between participants and the trainer. Two participants mentioned they learned from the trainer's sharing of experiences with peer feedback. Additionally, the flexibility the trainer displayed was valued. It gave participants opportunities to ask for clarification or examples. Participants suggested to keep room for this 'on the fly'-approach in possible iterations of the training.

Overall, all participants saw added value in how relatedness was addressed during the training, especially while learning from others' perspectives towards and experiences with peer feedback. However, feelings of relatedness were not mentioned to directly improve motivation for implementing peer feedback. Feelings of relatedness were mentioned to contribute to improved

knowledge, skills and beliefs, and to improved feelings of autonomy. Therefore, relatedness can be considered as indirectly contributing to improved motivation to implement peer feedback.

4.1.4 Motivation

On the overall theme of motivation, when asked in the posttest questionnaire if participants felt more motivated to use peer feedback after the training, four out of five respondents answered positively (pretest $M = 4.26$, $SD = .26$, posttest $M = 4.86$, $SD = .24$). In the corresponding reflection reports, those participants indicated that, even though they were motivated to implement peer feedback before, they felt more motivated because they felt more equipped to design and, partially, to host a peer feedback activity. One participant wrote: "I feel more positive as I know now what to do and how to do it. It is exciting to me to get started with it. Having uncertainty leads to inaction. I feel that I cannot do it if I do not know how, and now I do know how." One participant indicated she was already highly motivated and that her motivation had not increased because she felt it could not increase any further, but rather reconfirmed her motivation. This participant scored five out of five points on both the pre- and the posttest questionnaires. Since participants all indicated their feelings of competence and autonomy increased, and the relatedness with other participants contributed to their feelings of competence and autonomy, all aspects of SDT can be seen as contributing to improved motivation to implement peer feedback.

4.2 Research Question Two

To answer research question two: *'which elements of a peer feedback training are considered valuable by technical university teachers to increase motivation to implement peer feedback activities?'*, interviews were coded. Codes consisted of each of the nine strings of the Curricular Spiderweb. Focus during the interviews lay on establishing which elements of the training were considered valuable to help increase the motivation to implement peer feedback. Furthermore, the interviews helped determine if the chosen elements were the best choice for increasing motivation. Within the answers of the interviewees, distinctions between all nine codes were mainly clearly distinct. Separate, stand-alone codes were mostly applied. Some answers seem to bear an overlaps of two codes, mainly with comments on learning activities and content, on time and content, and on learning activities and materials and resources. If the overlaps was clearly present, these comments were coded as belonging to both codes. An overview of the amount of codes made can be found in Table 4.

One code, time, proved to have a clear overlaps with all other codes. One code, teacher role, proved to have a underlying relationship with other codes, but the overlaps was not clearly present in the comments. This was thus treated differently in the coding process. Teacher role in itself was

not mentioned that often, but did come up in relation to content and the learning activities. Examples are ‘the activities were adjusted to what we asked for’, and ‘examples were brought in based on questions we asked’. The comments hinted at the influencing factor being the trainer, but since participants did not mention the trainer being the influencing factor, these comments were not coded as teacher role.

Table 4

Amount of codes used during interviews

Thematic codes	Meaning of codes	Amount
Aims and objectives	Desired outcomes of training	20
Content	Information on peer feedback	25
Learning activities	Activities used during training	42
Teacher role	Person giving training	10
Materials and resources	Materials and resources used as preparation	5
	Materials and resources used during training	8
Grouping	Learning together with peers during training	16
Location	Place training took place	4
Time	Amount of time totally spent on training	36
Assessment	Assignments needed to round off training	0

4.2.1 Aims and Objectives

The aims and objectives for the intervention needed to improve feelings of competence, autonomy and relatedness, thus motivation. Participants indicated their aims and objectives were gaining more knowledge on and more skills in implementing peer feedback, specifically learning about designing a peer feedback activity. In addition, one participant pointed out she was curious how to deal with assessing peer feedback in class. After the intervention had ended, the set aims and objectives were also experienced by participants. Specifically, participants mentioned to have a better understanding of what peer feedback could add to their teaching, which requirements need to be in place to design and implement an activity, and which individual design choices could be made.

Participants pointed out that aims and objectives were comparable to their reasons for joining. They felt all aims and objectives were touched upon, and indicated an increase in their motivation to implement peer feedback. Not all participants agreed upon becoming more skilled, they mainly felt not skilled enough to fully implement peer feedback. This indicates that in the current intervention, skills was insufficiently addressed in relation to aims and objectives. Overall, targeting motivation in the aims and objectives was found contributing to improved motivation to implement peer feedback.

4.2.2 Content

The content of the intervention needed to focus on feedback first, and peer feedback thereafter. This approach was valued by all participants, because it broadened participants' knowledge. Participants related the given information to their own experiences regarding how their students' performed prior to the intervention. Understanding the different types and levels of feedback was mentioned as helpful to understand how different stages of learning within students' development could be approached. This could better suit students' needs in a peer feedback activity. It was also considered helpful in the decision making process of what to incorporate when designing an activity. One participant said: "Talking about the different levels and types of feedback really contributed to my understanding of what feedback is and what it can do for students".

The content of the intervention also focused on scientifically substantiated benefits and specific aspects of peer feedback, and practical ideas to implement peer feedback, which was valued by all participants. They felt strengthened in their choices to implement peer feedback, knowing it was substantiated by scientific literature. Scientific substantiation was also reported as helpful to gain practical knowledge about designing a peer feedback activity. Practical knowledge was said to clarify of how certain scientific concepts could affect design choices for a peer feedback activity. All participants indicated that the practical knowledge helped them make practical choices applicable to their own teaching situation. Additionally, knowing how to apply these practical choices was valued by all participants. All comments suggested that guiding the transition from scientific knowledge, through practical knowledge towards practical choices to be made, is sensible.

Overall, participants were satisfied with the offered content, and the content contributed to improved motivation to implement peer feedback. The division of the content between both sessions might need to be changed. In this training, the first session was more theoretical than practical, and the second session was more practical than theoretical. Applying similar amounts of time spent on theory and practical applications in both sessions, would better serve the transition from scientific knowledge to practical choices in both sessions.

4.2.3 Learning Activities

Learning activities used during the intervention required participants to actively process all the information, by working individually and together with other participants. Participants pointed out they valued the amount of opportunities to actively work on the content, and valued that sharing ideas and insights with other participants was part of the activities. One participant mentioned: "What I really enjoyed was the amount of interaction with each other. That just really made me happy participating". Some activities attracted more positive responses than others, and some were seen as more helpful by some than by others. Most positively valued activities were group

discussions and the continuous note taking, these were much appreciated by all. Participants also mentioned they generally already use notetaking as a learning tool. Four participants found it helpful that the trainer also kept notes on implementation choices made by participants throughout the activities. This was indicated to help participants get an overview of consensus of choices amongst participants. This notetaking was done to support the creation of the individual draft plan by all participants. All notetaking was found contributing to learning.

Activities that were seen more helpful by some than by others related to the whiteboard activities. These activities, in which participants thought about pros and cons of types of peer feedback activities and of design elements, were generally considered effective, because it helped participants to think about and discuss all choices they could make for designing an activity. One participant found the second whiteboard activity less helpful, since it bore resemblance to the first whiteboard activity. The second whiteboard activity could be replaced by another activity.

Overall, the group activities and notetaking contributed to motivation to implement peer feedback.

4.2.4 Teacher Role

Because of the aforementioned reasons to describe the teacher role as a trainer of teachers, this role was chosen to be described as trainer. The trainer's explanations on how to deal with dilemmas when making suitable choices on types of activities was mentioned as contributing to motivation. All participants mentioned the trainer was knowledgeable about and experienced with peer feedback, and was thus able to provide many examples of types of activities to choose from. The experience the trainer had with peer feedback, seemed to help participants bridge the gap between the scientific substantiation and the practical suggestions and implementation ideas. Additionally, the enthusiasm the trainer had for implementing peer feedback was mentioned by all as contributing to participants' becoming enthusiastic and motivated themselves.

The time the trainer was willing to spend on answering participants' questions and letting participants share own experiences was also mentioned as contributing to motivation. Participants indicated that both asking questions and hearing about others' experiences helped them get a full grasp of what a peer feedback activity could look like in their own teaching situation. One participant mentioned: "You (the trainer) give a lot of space to discuss, which is great. For you this must be challenging because then we take too much time. But I think that is what I benefit from the most."

Overall, the trainer of a peer feedback training should guide participants' thinking, and show flexibility in dealing with dilemmas participants might face when designing a peer feedback activity. These factors proved to be valuable contributions to motivation to implement peer feedback.

4.2.5 Materials and Resources

Materials and resources chosen for the intervention were divided into two parts: materials used during sessions, and used in an online environment outside of sessions. Firstly, materials used during sessions, like Post-its, whiteboards, and paper, were seen as helpful and contributing to increase knowledge, beliefs and autonomy, and partially skills. One participant pointed out she enjoyed the visual support of and content on the slides, which allowed her to stay focused and active during activities. The combination of having slides, the trainer's notetaking and the creation of an initial draft plan were mentioned as contributing to designing a peer feedback activity. Secondly, materials used outside of sessions were contributing to some. Not every participant felt the need for an online environment. Two participants found there were not many additional materials, beyond the preparational materials, listed there. Three participants favored the online environment, to retrieve all materials whenever they wished to. The use of preparational materials caused mixed feelings. Three participants pointed out required reading could be added to get a deeper understanding of the content and to get a more detailed first draft of a design for an activity. Two participants did not necessarily want to read upfront, but would have liked to receive a more extensive literature list to look at afterwards. One participant appreciated the minimal need for preparation. The "relaxed preparation" allowed for gradually diving into the topic.

Overall, the materials used during the sessions, like Postits, whiteboards, paper and slides, and the listed articles in the online environment could be seen as contributing to improved motivation to implement peer feedback. Materials could be extended with additional scientific reading, partially planned as required preparational reading.

4.2.6 Grouping

Grouping the participants during the intervention was set to be voluntary of nature, and restricted to twelve participants per training. The voluntary nature was not mentioned by participants separately, but all participants indicated they were there because of an own desire. This seemed to contribute to strengthening their learning and understanding. The small amounts of participants per training, four and two, was mentioned as a pity, because more participants would have meant more opportunities to share ideas and experiences. However, the small amount was also reported as having benefits, since it offered opportunities for a very individualistic approach within the sessions. Suggestions for best group sizes ranged between six to ten participants per run. Being in a group while following training was regarded as really valuable by all. This allowed for learning from others', which was mentioned as valuable.

Overall, the voluntary nature of participating was valued. Also, grouping smaller amounts of participants was seen as contributing to improved motivation to implement peer feedback, because it gave ample opportunities for individual attention, while still learning with and from others.

4.2.7 Location

The location was set to be a face-to-face setting near the participants' workplace, with opportunities for active learning. Location was scarcely mentioned during the interviews. Participants valued the face-to-face setup of the training, since this gave better opportunities for creating a personal connection with other participants and the trainer. They showed strong aversion to online trainings. Participants also mentioned valuing the training was on the university's campus, limiting the time needed to reach the location. Overall, hosting face-to-face trainings and hosting the training nearby the participants' own workplace was considered contributing to improved motivation to implement peer feedback.

4.2.8 Time

Time used on the intervention was set to be divided into three parts. These were 'time totally spent on training', 'time spent on different content during training', and 'time in between training sessions'. All aspects of time were considered valuable by all participants, although participants also indicated points that could further improve the aspect of time. Firstly, time totally spent on training was often mentioned. Everyone valued the time spent, however, four participants indicated they preferred spending more time. More time would ideally be created by adding one or even two extra session(s), in which participants could reflect on the design and implementation of their own activity, and share personal experiences with the activity thus far. Secondly, time spent on content during training was mentioned. All participants valued the time spent on theory, and on practical activities. Three participants indicated preferring more time for practical activities to design a peer feedback activity, beyond the creation of a draft plan. Thirdly, time in between sessions was mentioned. Opinions on the two weeks that were between both sessions differed. Three participants were satisfied, one preferred less time in between, and one more. Because of this differentiation, results on time in between sessions are inconclusive.

Overall, everyone was in favor of spending more time on the entire training, mainly having more sessions than the current two. Additionally, all agreed that this extra time should be spend on designing, evaluating and redesigning a peer feedback activity. No general agreement could be found in how much time should be between sessions. Spending at least three sessions of two hours each can be considered contributing to improved motivation to implement peer feedback.

4.2.9 Assessment

Assessment of the intervention was set to be the writing of a reflecting report. During the interviews, no detailed comments were made on this type of assessment. Participants indicated beforehand they were fine with writing a reflection report. Analysis of the reports turned out to have participants' responses more related to the questions needed for this research, than being a deeper personal reflection on the training. The lengths of each answer differed substantially between participants. Some participants showed a somewhat personal reflection, others answered so briefly that no deeper reflection on a personal level could be detected. Therefore, no common valued ideas of how assessment could contribute to an increase in learning could be found for this intervention.

Overall, the construct assessment could do with an alteration of the current setup, since this setup did not contribute to participants' motivation to implement peer feedback.

4.3 Overall Valuable Elements for Improved Motivation for Peer Feedback

With regard to the overall training features, multiple elements were used that supported overall motivation. Using the Curricular Spiderweb as a tool to incorporate these elements was found to be valuable. Strongest contributing elements were the learning activities that required active and both individual and group learning, time that was spent on the intervention and the content of feedback and peer feedback. Assessment was not found to be valuable to overall motivation, though writing a reflection report as a means to assess was found acceptable by participants of this intervention. The results show that using the Spiderweb to design a peer feedback training can help make adequate choices on which design elements to incorporate. The results also show that when designed adequately, the incorporated elements can contribute to teachers' overall motivation to implement peer feedback in their teaching.

5 Discussion and Conclusion

This research explored two research question. Firstly, what the influence of a training program on technical university teachers' motivation to implement peer feedback to their teaching a training university is. Secondly, it was explored which elements of a peer feedback training are considered valuable by technical university teachers to increase motivation to implement peer feedback activities. The results of this research indicated mostly expected and some unexpected findings, based on results of and suggestions made in previous research. All relevant and striking findings of the first research question will be discussed and concluded first. For the second research question, the most relevant and striking findings will be discussed and concluded. In Appendix 10.6, a description of the valuable elements of the remaining findings will be listed.

5.1 Improved Motivation for Implementing Peer Feedback

5.1.1 Discussion of Findings for Feelings of Competence, Autonomy, and Relatedness

Findings of this research show that participants all improved directly in feelings of competence and autonomy, and indirectly in feelings of relatedness. Especially, knowing that peer feedback does not have to cost additional time was an often listed factor positively weighing in on their considerations to implement peer feedback. This finding aligns with what previous research reported. Nicol et al. (2014) listed reduced need for teacher feedback when students participate in peer feedback, saving time. This was corroborated by Topping (2009), Sun et al. (2019), and Cabello and Topping (2020). Additionally, this research found that gained knowledge on the design and implementation of a peer feedback activity positive contributes to feelings of competence. This finding also aligns with previous research. Panadero and Alqassab (2019) found that students benefit from being prepared to participate in peer feedback by their teachers. Improving the knowledge of teachers on how to prepare students was earlier mentioned as necessary by Sluijsmans and Prins (2006), Topping (2009), Van Zundert et al. (2010) and Ashenafi (2017).

Participants gained positive beliefs towards peer feedback because of the training, even though it should be noted that this improvement was limited, due to already high positive beliefs participants had before the training started. This improvement aligns with suggestions made in previous researched that improving teachers' knowledge and skills on how to implement peer feedback through training would positively influence their beliefs towards peer feedback (Sluijsmans et al., 2004; Gielen et al., 2010; Panadero & Brown, 2017; Zhao, 2018; CELT, 2019; Panadero & Alqassab, 2019).

Participants gained skills in making own choices when designing a peer feedback activity, and in preparing students on participating in a peer feedback activity. This is in line with findings made by Sluijsmans et al. (2004), who found that teachers who received training on how to define criteria that need to be given to students to facilitate them in giving peer feedback improved in skills to design an activity that could be performed by students. However, participants of this research felt less skilled in the actual executing of a peer feedback activity. They felt they needed more time for the training, both in hours to be spend on training and in having a longer time-period for the entire training than was offered in the training for this research. These feelings are in line with findings from previous research that teachers are better served by having training set over a longer period of time (Guskey, 2002; Desimone, 2009; Hunzicker, 2011; Daumiller et al., 2021). For the design of a teacher training on peer feedback, more emphasis should be put on investigating how many sessions and how extended the total training period should be.

Regarding feelings of autonomy, this research found that all participants felt more autonomous in deciding how to implement peer feedback, by experiencing autonomy to design an activity suitable for their own teaching situation. Although in this research autonomy only slightly improved, the findings align with prior research. Previously, it was found that if teachers can autonomously decide if and how to implement peer feedback, this could improve their motivation to implement peer feedback (Sluijsmans et al., 2002; Sluijsmans et al., 2004; Sluijsmans & Prins, 2006; Van den Berg et al., 2006; Wen et al., 2006; Topping, 2009; Cabello & Topping, 2020). In these researches, in-service teachers were shown to better understand the benefits of peer feedback than preservice teachers did (Van den Berg et al., 2006; Wen et al., 2006), which helped them make more autonomous decisions regarding the implementation of peer feedback. This indicates that the findings of this research on autonomy can be regarded similarly, since technical university teachers can be seen as in-service teachers.

Regarding relatedness, this research found that participants appreciated learning from both the other participants and the trainer. The experienced feelings of relatedness to others during training corroborates finding in previous research. Multiple studies found that teachers appreciate learning from and with others (Desimone, 2009; Maskit, 2011; DeMonte, 2013; Daumiller et al., 2021). Learning from and with others about peer feedback can be achieved through a holistic training approach, in which training content is offered in combination with the sharing of professional and personal experiences teachers obtain on a daily basis (Guskey, 1985, 2000; Desimone, 2009; Hunzicker, 2011; Maskit, 2011; McKenney & Reeves, 2019; Cabello & Topping, 2020; Sancar et al., 2021).

5.1.2 Conclusion on Improved Motivation to Implement Peer Feedback

The aforementioned findings of this research help to answer the research question: *'what is the influence of a training program on technical university teachers' motivation to implement peer feedback to their teaching?'* This research found that participants experienced that a peer feedback training improved their feelings of competence and autonomy to implement peer feedback. Though participants did not immediately experience training improved their feelings of relatedness, relatedness did contribute to the experienced improved feelings of competence and autonomy. Thus, feelings of competence, autonomy and relatedness, as described in SDT, all contribute to improved motivation to implement peer feedback. Because of the smaller sample size, a preliminary conclusion should be drawn. Therefore, this research suggests that training technical university teachers on peer feedback does improve their motivation to implement peer feedback to their teaching.

5.2 Valuable Elements of a Peer Feedback Training

5.2.1 Discussion of Valuable Elements

Finding of this research showed that of the nine strings of the Curricular Spiderweb used, eight consisted of valuable elements, namely: aims and objectives, content, learning activities, teacher role, materials and resources, grouping, location, and time. Of these strings, five were found to be most relevant or striking: content, learning activities, materials and resources, time, and assessment. These will be discussed first. The remaining strings will thereafter be summarized briefly. A more thorough description of these strings can be found in Appendix 10.6.

5.2.1.1 Content

For the training's content, teachers were offered concrete and practical ideas on peer feedback (Guskey, 2002; Hunzicker, 2011; Sancar et al., 2021). Findings showed that participants valued this very much, since almost all concrete and practical ideas were both new to participants and rated as a valuable contribution to their motivation. Especially, knowing about different levels and types of feedback was found to be of added value. This benefit of better understanding the contribution of feedback when designing a peer feedback activity is supported by findings from Hattie and Timperley (2007) and Wisniewski et al. (2020). These researchers indicated that explaining the contributions of feedback, the best way to phrase feedback, and what to focus on when giving feedback, would strengthen students to give informative feedback. Informative feedback was also indicated by these researchers to improve the motivation of the feedback receiver to make changes in their own product. Additionally, concrete ideas on feedback and peer feedback helped participants realize why students are not always familiar with how to give feedback to peers that is phrased constructively and polite and is aimed at guiding the feedback's receiver. These findings are consistent with findings from Nicol et al. (2014), who suggested that fundamental feedback skills for students should receive more attention in higher education.

Practical ideas that were offered in the training regarded requirements teachers should set in place, guiding questions and prompts teachers could use to steer students, and preparational steps teachers need to take to implement peer feedback (Falchikov, 2007; Cho & MacArthur, 2010; Cabello & Topping, 2020). Suggestions given by these researchers, were also mentioned by the participants of this research. Especially training students, stimulating students to ask questions about the product, limiting the amount of feedback parts students should indicate, and setting up the environment in which students should provide peer feedback were mentioned as relevant practical ideas by the participants. These practical ideas helped them during the creation of their initial draft plan. Overall, incorporating concrete and practical ideas on peer feedback that teachers can use when designing a peer feedback activity can be considered a valuable element.

5.2.1.2 Learning Activities

For learning activities, teachers were asked to participate in activities that partially constructed their learning by gaining knowledge and skills to create their own draft plan. Findings of this research showed that participants valued the incorporated activities in which they worked together on understanding possible options for the design of a peer feedback activity. Especially, small group discussions and creating a draft plan were seen as very valuable. These activities helped participants decide which aspects to incorporate in their own draft plan, to serve the designing of a peer feedback activity. This is consistent with previous research, in which participating in learning activities during training was said to help teachers become engaged to learning, and often also increased their learning (Maskit, 2011; Korthagen, 2017; Daumiller et al., 2021). Overall, incorporating active learning activities that guide teachers decision-making processes for the design of a peer feedback activity can be considered a valuable element.

5.2.1.3 Materials and Resources

For materials and resources, distinctions were made between materials and resources used during the sessions, and outside of sessions. During and outside of sessions, theoretical substantiation of content on peer feedback was found very valuable by participants. This finding aligns with teacher characterizations made by Sancar et al. (2021), who said that teachers' characteristics of what they value are directly related to their own professional environment. These researchers indicated that teachers' experiences, beliefs, values and motivations immediately contribute to how teachers characterize themselves. For university teachers, scientific substantiation on why peer feedback is beneficial to students is fundamental to motivate teachers to implement it.

Additionally, during sessions findings showed that the use of slides, Postits, paper and whiteboard was valuable. Outside of sessions, required preparational reading was indicated as being valuable. This could be explained by teachers' need to have an active role in their own learning, and by considering taking teachers' ideas of how they best learn into account. This was already found by Maskit (2011) and Korthagen (2017). Preparational reading on peer feedback can be seen as individual learning, using slides, Postits, paper and whiteboard offers opportunities for individual and collaborative learning about peer feedback. Overall, incorporating scientific substantiation and resources to promote both individual and collaborative learning can be considered a valuable element.

5.2.1.4 Time

For time, a short training was chosen for its effectiveness on retention and stamina, as mentioned by Scott (2003) and Daumiller et al. (2021). Consistent with these findings, participants

found the training to be effective. Additionally, the limited time teachers can spend on training due to other tasks at work affected the chosen timeframe of two two-hours sessions (Guskey, 2002; Clavert et al., 2015; Sims et al., 2021; Brouwer et al., 2022). Though no indication was found that the shorter timeframe was of decisive importance for participants to participate, the limited amount of participants could be caused by this limited amount of time teachers have. Because of this, the amount of time chosen for this training was limited. However, unexpectedly, participants indicated they wanted a longer training, spending more time in total. Participants requested more sessions than the two offered, preferably spread out over a longer period of time than the two weeks this research had. This finding can be explained by findings from previous research, which stated that multiple sessions over a longer period of time better support teachers' needs to adapt to new training content (Guskey, 2002; Desimone, 2009; Hunzicker, 2011; Daumiller et al., 2021). Even though expanding the time of a training could lead to less teachers willing to participate, a longer timeframe will most likely be more effective for building skills. Overall, having at least three sessions, stretched out over a longer period of time, can be considered a valuable element.

5.2.1.5 Assessment

For assessment, participants were asked to write a guided reflection report, which can help people express their self-development that took place during and after the training. Though participants answered all questions, the ALACT-model used to guide the report proved to lead to superficial reflections, that did not always express the expected self-development. These superficial responses indicated that more guidance is needed when asking for expressions of self-development. Guidance can lead to more in-depth insights. However written in-depth reflections upon experiences can be seen as time-consuming (Walker, 1985). For teachers, in-depth reflection can be more time-effective if they are guided by a model that does not require writing. After these insights, participants might be better served by using The Reflection process in Context-model by Boud et al. (1985). This model consist of three phases: the first phase is experiences, the second reflective processes, and the third outcomes. During the first phase participants would think about behaviour, ideas and feelings. During the second phase participants return to experiences. By letting them utilize positive feelings and removing obstructive feelings, they can re-evaluate the experience. During the third phase participants place new perspectives upon experiences. This can lead to participants changing their behaviour, being ready for application of changes, and commitment to action. The transitions from phase one and two to phase three take place by thinking about experiences. Participants thus do not need to write the reflective process down. They can make annotations of important ideas and beliefs, and use these annotations for creating changes. For participants in a peer feedback training, that could mean noting down which aspects of the design can remain and which need change or

removal, and which teacher behaviour was effective or needs change. These notes can then steer a redesign and alternative implementation of the peer feedback activity. Overall, using a reflective model that guides the thinking process, but does not require much writing can be considered a valuable element.

5.2.1.6 Remaining findings

The remaining strings all had valuable elements, though less striking than aforementioned strings. Participants came to the training with clear aims and objectives, namely to gain knowledge about and skills in peer feedback. Findings showed the training addressed and bridged the knowledge gap between current and desired performance. However the skills gap was addressed, but not bridged. The amount of time chosen for the training was found to be the underlying reason. The teacher role was found to be effective, because of the knowledge and skills, and the experience the trainer had. Grouping was found to be effective to learn from and with each other, although participants indicated to favour slightly larger groups. The location was valued because it was close to the workplace.

5.2.2 Conclusion on Valuable Training Elements

All aforementioned findings help to answer the research question: *'which elements of a peer feedback training are considered valuable by technical university teachers to increase motivation to implement peer feedback activities?'*. This research found that valuable elements based on findings of and suggestions made in other research should be implemented. Emphasis should be on building knowledge about and skills in peer feedback, and on giving scientific and practical ideas and examples about feedback and peer feedback. Additionally, emphasis should be on spending at least three sessions to incorporate scientific and practical information and to offer teachers opportunities to design and implement a peer feedback activity, expanding all sessions over a longer period of time. The training should have ample opportunity for participants to learn from and with other participants, preferably from the same educational institute, and from a knowledgeable trainer who has experiences with peer feedback. The training is preferably hosted nearby the workplace and offers materials and resources that participants can also use after the training has ended. The training's assessment should focus on supporting the reflective thinking process of teachers, to better enable possible redesigns of their own peer feedback activities after the training had ended. All these elements will contribute to improve knowledge about, skills in and beliefs towards peer feedback, together improving feelings of competence in implementing peer feedback. These elements also strengthen feelings of autonomy to decide if and how to implement peer feedback, and strengthen feelings of relatedness to learn how to implement peer feedback with and from

others. This research thus suggest that using valuable training elements in a peer feedback training help to improve teachers' motivation to implement peer feedback to their teaching.

6 Implications and Limitations

This research contributes to understanding how technical university teachers can improve their motivation towards implementing peer feedback by means of following a specially designed training on peer feedback, and how such a training is best designed. Firstly, this research contributes to what is needed when improving technical university teachers' motivation to implement peer feedback. Previous research was mostly done on preservice teachers at universities of applied science-level, and on teachers within the social context, applying peer feedback training on social interactions in the medical sector. These teachers already have educating others as part of their field of expertise's domain. This research targeted technical university teachers. These teachers often have not learned about educating others about their field of expertise while being educated themselves. While working at a university, educating students becomes part of their task description. This research thus sheds light on how technical university teachers are best motivated to learn about and implement peer feedback to their teaching. This research shows that their motivation in learning can be approached in a similar way to that of teachers that already learned about educating students before. For technical university teachers, learning about peer feedback can be shaped based on what is already known about how teachers learn in general. Then, technical university teachers could similarly improve their feelings of competence, autonomy and relatedness, and thus improve their motivation towards implementing peer feedback.

Secondly, this research contributes to what is needed in a specifically designed training on peer feedback for technical university teachers. Previous research on needs in a peer feedback training did not target teachers' needs nearly as often as students' needs. Previous research' suggestions for teachers trainings on peer feedback indicated several elements to consider, namely improving competence in how to apply formative assessment such as peer feedback, knowledge about benefits and effects of peer feedback, and improving competence in how to design of a peer feedback activity. This research indicates that incorporating these elements in a peer feedback training for technical university teachers indeed contributes to an improved motivation to implement peer feedback. The found improved feelings of competence applied to knowledge about and skills in both applying peer feedback and benefits and effects of peer feedback. The found improved feelings of competence also applied to the design of a peer feedback activity. This research thus found these previously made suggestions all apply to improving technical teachers' motivation for peer feedback.

Thirdly, this research found which elements of a specifically designed training on peer feedback for technical university teachers are considered valuable to improve their motivation for

peer feedback. Though valuable elements of training teachers in general have been researched in many studies, no detailed overview of how those elements could be shaped in a specifically designed teacher training on peer feedback could be detected in previous research. This research thus contributes to understanding how a teacher training on peer feedback could best be designed.

Fourthly, this research sheds light on the practical application of a designed peer feedback training for university teachers. The overlaps in the observed participants' preferences gives insight into how to present important features during the training. These features include the incorporation of an order to present content on feedback and peer feedback, the preference for repeated notetaking and for repeated room for individual perceptions and ideas regarding the applicability of the content to participants' own teaching situation, the selection of some preparational scientific reading materials, the spread of the total time to be spent on training over at least three sessions in a timeframe in which teachers can design and implement a peer feedback activity, and the use of an assessment method that contributes to teachers' development of implementing peer feedback more than reflecting on the training's content and design. Especially university teachers could be served by focusing on these features, as these features can broaden their understanding of and experience with designing and implementing a peer feedback activity to their teaching. University teachers often had less training on teaching activities' design and implementation. Experiencing the practical application of a helpful training can provide participants with insights and tools on how to design activities for their teaching situation beyond the scope of the to-be-designed peer feedback activity.

Despite these aforementioned implications, some limitations need to be considered when interpreting the results. Firstly and foremost, the limited number of participants in this study should be addressed. Because only five participants of the training were willing to also participate in this research, no statistical tests could be run. Thus, the results all came from qualitative analysis. Although the qualitative analysis showed almost no difference in outcomes between participants, results of this study cannot already be generalized to a larger population of technical university teachers. Future research could be directed at training more technical university teachers to try to extend the findings of this research and make a generalization to the larger population possible.

Secondly, the sign-up of the participants was voluntary, making the sample group non-random. The participants of this research were already motivated to use peer feedback. Despite their initial motivation, their motivation to implement peer feedback still improved. This strengthens the conclusion that training technical university teachers on peer feedback to improve motivation to implement peer feedback is indeed effective. However, outcomes for non-voluntary participants of such a training might turn out differently. Future research could try to discover if technical university teachers' motivation towards peer feedback will also improve when participants are imposed to a peer feedback training.

In summary, training technical university teachers on peer feedback can positively influence their motivation to implement peer feedback to their teaching situation. This knowledge contributes to understanding how technical university teachers can be motivated to implement peer feedback, and which elements help to improve that motivation. The knowledge also contributes to understanding how peer feedback trainings at other technical universities could be designed and executed, in the hopes of spreading enthusiasm for and motivation to use peer feedback as learning activity to strengthen university education.

7 References

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8.2 Pretest Questionnaire

This questionnaire cannot be published due to confidentiality of one of the used sources. Information can be requested by emailing the author of this thesis.

8.3 Posttest Questionnaire

This questionnaire cannot be published due to confidentiality of one of the used sources. Information can be requested by emailing the author of this thesis.

8.4 Reflection Report

Reflection report questions

Korthagen's cycle of reflection consists of five parts: action, looking back on action, becoming aware of important aspects, creating alternative actions, and trying alternative actions. For each part one question is asked, to which you can respond in your own words, and your own line of reasoning.

Please answer each question directly underneath each part on action, looking back on action, becoming aware of important aspects, creating alternative solutions, and trying alternative solutions. For the last, sixth question, feel free to remove the option that is not applicable to you.

Name:

Question 1: Action:

What did you initially think about Peer Feedback? What do you think of it now?

Question 2: Looking back on action:

How did your perception towards Peer Feedback change during and after the training?

Question 3: Becoming aware of important aspects:

What new insights, skills or knowledge did you gain during the training?

Question 4: Creating alternative solutions:

Which of those skills are applicable to your specific teaching situation?

Question 5: Trying alternative actions:

What basic elements would a Peer Feedback activity entail in your specific teaching situation?

Question 6: Did your motivation towards implementing change now that you followed the training?

- If yes, to what extent?

Please indicate if you think more positive or negative towards Peer Feedback.

Please also briefly describe which different attitudes you had and now have were key in changing your motivation.

- If no, please indicate if your attitude remained negative, neutral, or positive.

Please also briefly describe why you feel your motivation was not changed. Was this because of attitudes you previously already possessed and/or new insights you gained? Which ones?

8.5 Interview Questions

Interview questions

For the interview I hope to gain insights in how the training is valued. Distinctions are made between offered content, offered activity types, time spent on the training, opportunities for a personal/individual approach and opportunities to apply content to the own situation.

Content:

What content did you find valuable? Why?

What content wasn't helpful? Why?

What content should be offered more extensively? Why?

What content should be offered less extensively? Why?

Activity types:

Which activities contributed to your understanding? Why?

Which activities did not contribute to you understanding? Why?

Which activities did you personally like, regardless of them contributing to you understanding? Why?

Which activities did you not like? Why?

How do you value the differences between offered activities?

Were there activities you would have rather seen offered? If yes, which ones?

Time spent:

How do you value the time that was asked from you to spend on the entire training?

Which elements took more time than you expected? Which less time?

Which elements would you have liked to spend more time on? Which less time?

How do you value the time between both sessions?

How do you value the time you had to hand in the reflection report?

Opportunities for a personal/individual approach:

How well could you see the offered content be applicable to your situation, purely as it was offered?

How well were you able to seek additional help/input to make the content applicable to your situation?

Would you like to have an even more personal approach? If yes, would you rather have to spend more time on the actual training, or should specific content then be left out? If the latter is yes, then which content?

Opportunities to apply the content to the own situation:

How well were you able to relate the content of the training to you situation?

How well can you apply the knowledge?

How well can you apply the skills?

How well did the creation of a draft plan help you thinking of applying Peer Feedback to your situation?

Do you see yourself applying peer feedback now? If yes, how likely? If no, what hinders?

8.6 Discussion and Conclusion of Remaining Strings of Research Question Two

8.6.1 Aims and Objectives

For aims and objectives, Carliner (2015) found that training programs for adult learners should have meaningful goals, and should address the gap between the current and desired performance of participants. Consistent with these findings, this research found that participants all had a clear and similar aim for following the training. Additionally, participants found the training addressed the knowledge gap between current and desired performance, and found the gap was bridged. Although participants indicated the training did address the skills gap between current and desired performance, they did not feel this gap was bridged. Findings showed that participants did not feel they could effectively use the gained skills in fully implementing a peer feedback activity, which can be seen as a complex situation (Westera, 2001). In the aims and objectives more emphasis must be placed on having teachers gain more skills in how to fully implement a peer feedback activity. This will help to bridge the gap between teachers' current situation to the desired situation. Therefore, determining effective aims and objectives that help build skills on how to fully implement a peer feedback activity can be seen as valuable.

8.6.2 Teacher Role

For teacher role, the determination by Lunenberg et al. (2014), considering the trainer of this peer feedback training as a second order teacher, was adopted. For second order teaching, the trainer should provide both theoretical and tacit knowledge. Additionally, the trainer should promote active and self-regulated learning. Consistent with these descriptions, this research found that delivering theoretical and tacit knowledge by the trainer was indeed considered as very helpful. Especially, the holistic approach of combining theoretical and tacit knowledge of the trainer with the participants' experiences, was seen as contributing to motivation. Additionally, this research showed that in a peer feedback training active and self-regulated learning was seen as valuable. The active participation during the training helped participants become self-regulated in creating their own draft plan, needed for designing and implementing a peer feedback activity. Therefore, having the trainer of a peer feedback training possess theoretical and tacit knowledge on peer feedback, and applying active and self-regulated learning can be seen as valuable.

8.6.3 Grouping

For grouping, two aspects were found valuable: learning from and with each other, and learning in smaller groups to enable a more personal approach. Findings showed participants

strongly valued group learning. Participants indicated that they learned from beliefs about and experiences with peer feedback other participants had, and that discussing new content helped them shape ideas and beliefs about peer feedback and the design of a peer feedback activity. Learning from and with each other was found to be effective in multiple studies (Clarke & Hollingsworth, 2002; Hunzicker, 2011; DeMonte, 2013; Clavert et al., 2015; Sancar et al., 2021).

Learning in smaller groups was indicated to be valuable for university teachers, because of the individual approach teachers could receive while learning (Brouwer et al., 2022). Findings showed that participants valued the personal approach this research offered due to the smaller number of participants. However, groups should have enough participants to be able to interchange ideas and beliefs with several other participants. This research had one group of two participants. This led to these participants less strongly valuing the effectiveness of the learning than the other group, that had four participants, did. Therefore, having a number of participants that gives opportunities for interactions with different participants and still holds room for personal approaches by the trainer can be seen as valuable.

8.6.4 Location

For location, the training was located near the work location of the participants, as suggested by Kneale et al. (2016), making it an in-house training. In-house training would better give opportunities to share ideas and beliefs that apply directly to the own teaching situation (Popova et al., 2016). Consistent with these finding, this research found that participants valued the closeness to the workplace, and the learning from and with (immediate) colleagues. Participants indicated that examples of workplace experiences were relatable due to the recognition of participants' own experiences in the same workplace. Therefore, having a peer feedback training with colleagues and held in-house can be seen as valuable.