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Performance- vs. mastery-oriented digital feedback in simulation training: An experimental research approach

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SUMMARY

This study inspects the potential relationships between performance-, and mastery-orientated digital feedback, and perceptions of fairness, and relevance of feedback received during simulation training. We also included self-efficacy as a possible moderating variable. Using established theory and research on the construct of performance-, and mastery-oriented feedback, fairness and relevance and self-efficacy, we derived at 7 testable hypotheses that are exposed to empirical examination. We tested our hypotheses using a quasi-experimental posttest design with two conditions, where the digital feedback provided to the trainees by the simulator was manipulated. One group received performance-oriented digital feedback, and the other received mastery-oriented digital feedback.

Our results indicated a positive relationship between self-efficacy and perceptions of feedback relevance. Otherwise our hypotheses received no support, as statistically significant differences were not found, and we can therefore not make any causal inference about the relationship between performance and mastery oriented digital feedback and perceptions of fairness and relevance of feedback during training. Patterns did emerge from our data, indicating slightly more positive perceptions of feedback in the PODF group, compared to the MODF group, however not at a significant level.

Possible explanations for the non-significant findings are discussed, where the lack of an adequately sized sample, non -randomized assignment to the experiment groups and operationalization of the two conditions of the experiment, are brought forth as important, unfavorable factors. A potential practical implication of this thesis is how feedback might be distributed in organizations, and a potential theoretical implication is presenting a novel combination of the included variables in hypothesizing certain relationships, in light of a computerized simulator.

1 INTRODUCTION

1.1 *Introduction*

The positive effects of feedback on individuals' performance have long been established in organizational research, such as increased performance, learning, motivation and employee well-being (Ilgen, Fisher & Taylor, 1979; Anseel, Beatty, Shen, Lievens & Sackett, 2015; Johnson, Perlow & Pieper, 1993; Krenn, Würth & Hergovich, 2013; Erhel & Jamet, 2013). Feedback is also recognized as an important influencer for organizational growth and effectiveness (Lim, Connor & Remus, 2005) and for individuals in achievement situations to improve knowledge and skills (Hattie & Timperley, 2007; Shute, 2008). The scope and scale of possibilities and implications of feedback delivery in organizations are especially comprehensive in today's digitized world (Schwab, 2017; Scheeler, McKinnon & Stout, 2012; Goodman, Brady, Duffy, Scott & Pollard, 2008), as technological advances continue at a rapid rate.

Research also shows that some type of feedback can be more impactful than others, such as computer feedback (Hattie & Timperley, 2007) and when applied to digitized training platforms, it shows several benefits for training such as increasing motivation and persistence exerted into tasks (Mumm & Mutlu, 2011; Fogg & Nass, 1997). Type and formulation of feedback has been found to provoke forth different goal orientations in individuals when performing tasks (VandeWalle, Cron & Slocum, 2001) respectively aiming to achieve high performance appraisals, or mastery, - and learning from tasks; referred to as performance-oriented and mastery-oriented feedback (Johnson, Perlow & Pieper, 1993). In a computerized form, delivered through a simulator, performance-oriented digital feedback (PODF) is defined as digital feedback that is implicitly evaluating, cuing trainees focus on assessing their performance during simulation, whilst mastery-oriented digital feedback (MODF) is defined as digital feedback that is implicitly learning oriented, cuing trainees focus on exploration and mastery to improve their competency (Johnson, Perlow & Pieper, 1993; Harackiewicz & Larson, 1986; Earley, Northcraft, Lee & Lituchy, 1990; Ames & Archer, 1988; Dweck, 1991; Kamins & Dweck, 1999; Dweck, 1991).

Individual reactions to these types of digital feedback can be partly attributed to individual perception, which is the psychological process of turning

objective sensory input into subjective experiences (Buchanan & Huczynski, 2017, p. 250). Two important aspects of feedback perceptions in the organizational context are perceived fairness (Cohen-Charash & Spector, 2001) and relevance. Perceived feedback fairness is the extent to which feedback is assessed by the individual as being based on relevant and accurate information, and free of irrelevant or biased information (Colquitt & Zipay, 2015) whilst, relevance perceptions of feedback are the extent to which feedback is assessed as useful for the individual, for example in relation to work performance (Keller, 2009; Loorbach, Peters, Karreman & Steehouder, 2015). Applied to digitized feedback, we argue that these individual feedback perceptions may depend on content, type and formulation of feedback. Additionally, it depends on characteristics of the individual such as the degree of self-efficacy, which is the belief in one's ability to execute behaviors that help to reach pre-defined goals (Bandura, 1977). Self-efficacy has shown to moderate the effect of the feedback types performance oriented digital feedback and learning oriented digital feedback (Johnson, Perlow & Pieper, 1993; Watson et al., 2013; Kozlowski et. al., 2001; Dweck & Leggett, 1988), in addition to the relationship between goal orientation and learning (Watson et al., 2013; Dierdorff, Surface & Brown, 2010). Specifically, we argue that the ways in which the trainees participating in the simulator program perceives the different types of digital feedback are contingent on their own evaluation of their abilities to perform. In other words, their degree of individual self-efficacy.

While many of the motivational-, and performance-related outcomes of feedback, specifically performance-, and mastery-oriented feedback, also its relatedness to self-efficacy are known, there is to our knowledge a lack of research on how these feedback types are perceived in terms of its fairness and relevance. More explicitly, there seems to be a gap in the literature on the particular cognitive pathways leading to how these two types of digital feedback delivered through a computerized simulator, may relate to perceptions of feedback fairness and relevance, particularly when including self-efficacy as a moderator.

In this study, we address this gap by examining a potential relationship between these concepts. More specifically, by studying the different feedback forms, PODF and MODF delivered by a simulator to trainees, and how these forms of feedback may be perceived in terms of its fairness and relevance. We

also propose that this relationship is influenced by self-efficacy, which we suspect will mitigate the relationship between these variables in addition to being related to perceptions of the feedback itself. More specifically, we propose that those trainees with high individual self-efficacy will perceive the feedback as fairer and more relevant. With that, we aim to look at the impact of these different digital feedback types in simulation training—that is, in a simulation training context in which the feedback in the simulator is altered, providing trainees with PODF and MODF—and examining how these types of feedback may relate to fairness and relevance perceptions.

The intended contribution of the present study is threefold. First, to extend the current theoretical understanding in the field of simulation training, arguably of increasing relevance today given the technological opportunities arising for digitized training, such as digital game-based learning (Erhel & Jamet, 2013; Schwab, 2017). Second, to add to existing feedback theories, more precisely feedback types that are provided digitally from a computerized simulator. Our hope is that this study will present a theoretical contribution in gaining relatively specific insights into psychological reactions to performance-, and mastery-oriented digital feedback. Specifically, how feedback that orients individuals towards performance, versus mastery, may cause different feedback fairness and relevance perceptions. Third, we also hope to bring novelty into to the well-established theoretical understanding of self-efficacy (e.g. Bandura, 1977; Silver, Mitchell & Gist, 1995; Brown, Ganesan & Challagalla, 2001; Maddux, 2002; Bandura, 1986; Maddux, 2016) which as mentioned has proven to be an important moderator and influencer of several relevant relationships by investigating whether self-efficacy is significantly related to perceptions of feedback fairness and relevance. We have therefore decided upon the following research question:

1.2 *Research question*

How may performance and mastery oriented digital feedback relate to the perceived fairness and relevance of feedback received in simulation training?

1.3 *Outline of thesis*

The rest of this thesis is structured as following: In Chapter 2 we will present relevant theory and the conceptual framework of our thesis, along with our 7 hypotheses intended to illuminate our proposed research question. Chapter 3

outlines the method, design and procedures involved in investigating the potential relationships. In Chapter 4, an overview of the results will be presented. These will thereafter be discussed in greater detail, in light of theory and reflections in Chapter 5 where we will consider theoretical and practical implications, in addition to limitations and directions for future research. Lastly, in Chapter 6 we will summarize and conclude.

2 THEORETICAL BACKGROUND AND HYPOTHESIS

This chapter represents the theoretical framework of this thesis. First, an introduction of digital game-based learning and simulation will be presented to provide an overview of the topic. Then, the conceptual model for this thesis will be visualized. The model represents the key concepts in this thesis that will be presented and discussed onwards in this chapter with the hypothesized relationships. These concepts are: goal-orientation and performance-, and mastery-oriented digital feedback, feedback fairness and relevance perceptions and lastly, individual self-efficacy.

2.1 *Digital game-based learning and simulation*

Digital game-based learning (DGBL) is a tool used within development, that are based on active learning methodologies intended to promote knowledge acquisition by engaging and challenging the trainee to achieve wanted learning objectives through interaction and higher control over the activity (Erhel & Jamet, 2013; Romero, Usart & Ott, 2014). Further, it may foster continuous interest over a longer period of time that enables practicing of knowledge and skills (Hamari et. al. 2015). DGBL can take the form of digital simulations, allowing the trainee to practice knowledge, skills and abilities (KSA's), in a virtual environment (Erhel & Jamet, 2013) in a way that embodies and reflects the KSA's sought to be trained (Salas & Cannon-Bowers, 2001). Such simulations are interactive digital learning environments for the purpose of training. It places the trainees in a life like and somewhat simplified replication of a situation that provides instant feedback about questions, decisions and actions, in order to achieve particular goals and learn the consequences of decisions (Crokall, Oxford & Saunders, 1987; Merchant, Goetz, Cifuentes, Keeney-Kennicutt & Davis, 2012 Salas & Canon-Bowers 2001; Issenberg et. al., 1999; Boyle et. al., 2016; Wilson et. al., 2009; Sitzmann, 2011; Nebel, Schneider, Schledjewski & Rey, 2017; Gros, 2007).

Simulations are often modelled through computer-based software with game-like features where the trainee has to maneuver through a platform and are given different tasks and/or problems to solve (Deterding, Dixon, Khaled & Nacke, 2011). Trainees can then be taught how to deal with- and perform tasks in order to prepare for an actual event that requires utilization of the learned KSA´s through the simulation training. Simulations mainly focus on exploratory behavior and it allows trainees to practice their skills in a safe environment, that otherwise

may be difficult or dangerous (Nebel, Schneider, Schledjewski & Rey, 2017; Merchant et al. 2012; Crokall, Oxford & Saunders, 1987). For example, such as practicing skills needed in order to conduct a difficult conversation with an employee in an organization that otherwise would have real life consequences for the employee involved. Simulatotion will then provide trainees with the opportunity to practice, while allowing room for errors.

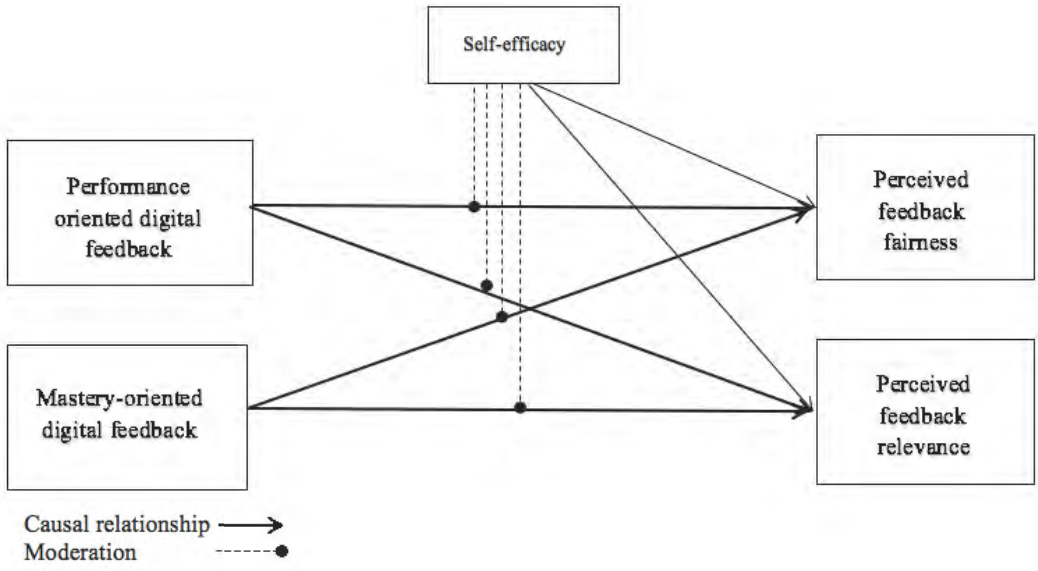
Simulations will also exhibit role-play features, and partially overlap with scenario-based training which is the use of specific scenarios to achieve learning outcomes connected to different disciplines (Caltabiano, Errington, Ireland, Sorin & Nickson, 2018). It is frugal to consider role-play as an embedded component in simulations, and some theorists argue that when a role play starts, we always have a simulation at hand. Role-play is learning through enactment, and within scenario-based learning a simulated scenario provides the context for the role-play. Trainees may for example be asked to enact the role of a therapist, counselling a client with a specific issue (Crookall, Oxford & Saunders, 1987; Caltabiano et al., 2018). The performer of a role is simulating some real-world role, or type. The scenario represents the given, contextual circumstances that are enacted, and the simulation starts, or is "brought to life" when the participants go into character and ends when they exit character. The trainee will have to submerge themselves into the digital world of the simulated characters and take on the role of one lead-character, much like in physical, real-life, simulated scenarios (Crookall, Oxford & Saunders, 1987, p. 149). For this thesis, we ask trainees to enact the role of a leader in a gamified simulator, providing a leader-specific scenario.

Game elements, such as vibrations, sounds, points, flashes etc. (Cooper et. al., 2018) are often included in such computerized simulators, as they are recognized as important motivators and promote psychological safety to users by introducing something immediately recognizable to them, often encouraging playfulness (Seaborn & Fels, 2015; Landers, 2014). Studies generally supports game elements as a performance enhancing measure when included in simulators, and that the introduction of merely one or more individual game components can be beneficial to performance (Cooper et al. 2018; Seaborn & Fels, 2015; Landers, 2014). This provides us with interesting insights into cognitive, and behavioral reactions to game elements during simulations as a way of providing the trainees

with feedback on their performance. However, to our knowledge, many individual psychological reactions to simulators and game-elements, beyond being recognized as motivating and as a highly practical way of conducting (scenario-) training (Issenberg et. al., 1999; Crokall, Oxford & Saunders, 1987), remain understudied to this day.

In the present simulator, such game elements are included in specific parts of the digital feedback. These are points, scores and barometers, referred to as performance oriented digital feedback presented in section 2.3. These game elements are not included in the descriptive feedback generated from the simulator considered as mastery-oriented digital feedback. For our thesis, we therefore wish to inspect how these different types of digital feedback may relate to how trainees perceive the feedback in terms of fairness and relevance during a computerized simulation. These possible relations are presented in a conceptual pathway model below. The concepts presented in the model will be discussed in detail onwards in this thesis.

2.2 *Conceptual model*



Model 1: Conceptual model of the relationship between performance-oriented, - and mastery-oriented digital feedback and perceptions of feedback fairness and relevance, with self-efficacy as moderator and direct influencer

2.3 *Performance-, and mastery oriented digital feedback*

2.3.1 Performance oriented and mastery-oriented goals

Goal orientation (GO) is shown to be one of the more prominent influences in terms of learning and performance in the training research literature, recognized as an important factor in training (Kozlowski et al., 2001; Colquitt, LePine & Noe, 2000). GO is used to describe an aspect of individual motivation underpinning individuals' efforts towards achieving predefined goals. Largely subconscious, it works at an implicit level and may aid us in understanding the different patterns of behavior and cognition that occur in individuals partaking in achievement situations such as test taking or various work tasks (Dweck, 1986; Dweck & Leggett, 1988; VandeWalle, Cron & Slocum, 2001). For this occasion, the patterns of behavior of trainees partaking in simulation training. Within the GO literature a distinction is commonly made between two orientations; *performance goal-orientation* and *mastery goal-orientation,* also known as learning orientation.

Performance goal orientation refers to the aspiration to prove one's ability in order to be successful or outperform others with as little effort as possible, such as achieving the highest or best possible score in simulation training. Mastery goal orientation is the aspiration to develop skills and abilities, or to master new knowledge, for example in a certain topic of interest (Erhel & Jamet, 2013). Those individuals with a predisposition for performance goal orientations are motivated by proving adequacy of-, and disproving inadequacy of ability, and those with a mastery-oriented disposition are driven by challenging themselves, and a desire to increase their competency and skills (Dweck & Leggett, 1988; Dierdorff, Surface & Brown, 2010; VandeWalle, Cron & Slocum, 2001).

Additionally, individuals with a mastery-orientation approach different situations with a focus towards self-improvement in ways that they believe efforts of exploration and learning will generate self-improvement. Errors and feedback are regarded as indicative of the process in which they search for improvement and is viewed as an aid for learning. In contrast, individuals with a performance-oriented disposition tend to seek out easy situations that yields positive responses, and avoid challenging situations and feedback, especially negative feedback (Kozlowski et. al. 2001). This distinction can be beneficial in the case of

simulation training, as it can prompt the trainees focus either on achieving the highest feedback score, or mastering new knowledge (Erhel & Jamet, 2013).

Studies have found that performance orientation is related to several negative outcomes such as lower academic achievements and lower levels of effort exerted into tasks, whilst mastery orientation is associated with several positive outcomes such as higher academic performance, and work achievements (Payne, Youngcourt & Beaubien, 2007; Grant & Dweck, 2003). Orienting learners towards mastery, through promoting a focus on effort and practice instead of personal attributes and performance outcomes does spur positive responses to the process consistent with mastery-orientation, lending support to the work of Dweck & Leggett (1988). Further, performance-orientation is linked to lowered intrinsic motivation and perceptions of self-worth, and less effort after failure in contrast to mastery-orientation, which is linked to higher intrinsic motivation and increased persistence after failure (Grant & Dweck, 2003; Buchanan & Huczynski, 2017).

2.3.2 Performance oriented and mastery-oriented goals as type of feedback

Individuals goal orientations can be contingent on the type and formulation of feedback received during training or when performing a task (Kamins & Dweck, 1999). This is supported by Johnson, Perlow & Pieper's (1993) study of the effect of performance-oriented-, versus learning-oriented feedback as type of feedback. In the present study, the two aforementioned goal orientations will be used as a description and function of type of feedback the trainees will receive through the simulation training rather than the individual construct in which the goal orientations explain the motivation behind individual's effort to obtain goals. The different feedback types will be referred to as respectively performance-oriented digital feedback (PODF), that cues focus towards performance outcomes i.e. knowledge about results, and mastery-oriented digital feedback (MODF), that provides descriptive information on how to improve and-, or to perform a task (Johnson, Perlow & Pieper, 1993) in simulation training. In the present study, the different feedback types will either direct focus on the trainee's performance in order to obtain the highest possible scores, or providing encouragement towards learning new knowledge and improving skills.

PODF can be characterized as computer generated feedback provided by the simulator during training, such as points, scores and barometers, indicating if

the trainees are on a right path. A type of point system are video game scores i.e. a visual score found in most computer- and video games (Zichermann & Cunningham, 2011). Points have been shown to increase engagement, and to be beneficial for performance in training using simulators (Cooper et al., 2018; Mumm & Mutlu, 2011; Hamari, Koivisto & Sarsa, 2014). In the present study, PODF is concurrent, meaning arriving simultaneously to task performance, therefore it can be used to adjust strategies during the simulation (Buchanan & Huczynski, 2017, p.157). In this thesis we will use the term instant for this type of feedback.

PODF should direct focus on evaluating and proving one's competency rather than increasing it, to accomplishing favorable outcomes. Individual consequences may be negative behavioral reactions, such as decreases in effort during the simulation training (Johnson, Perlow & Pieper, 1993). When subjected to performance-oriented feedback, the trainee might perceive the feedback as evaluative and judgmental information (VandeWalle, Cron & Slocum, 2001) due to the lack of descriptive information, merely focusing on indicating performance levels. These game elements should therefore divert some attention away from learning and mastery, to instead lead the trainee to focus on performing well according to these elements by filling barometers, achieving high numerical scores etc. Receiving feedback that orients trainees towards receiving favorable judgments on their performance, such as by for example focusing on how they score, or simply demonstrating skills and receiving good feedback, may occur at the cost of focusing on remaining present-minded in order to learn.

MODF is characterized as computer generated feedback of a descriptive nature, providing the trainees with information regarding what choices they made that were correct, areas of potential improvement etc., and should provide subjects with more task specific information in order to enhance learning. Mastery-oriented feedback is often expected to enhance performance through both cuing- and informational functions for improving task strategies and performance (Johnson, Perlow & Pieper, 1993) and can also be used to adjust future performance (Buchanan & Huczynski, 2017, p. 157). This is expected to occur mainly because of the specific, and descriptive nature of the feedback being more suitable for task specific strategy revision and accumulation of knowledge, understanding of the tasks and perseverance. In the present study, MODF is

delayed, meaning that the feedback will not be provided until the end of the simulation (Buchanan & Huczynski, 2017). Research links mastery orientation-, and mastery-oriented feedback to positive emotions and mind states in trainees during learning, which should also increase positive perceptions of the simulator and its feedback (Johnson, Perlow & Pieper, 1993; Buchanan & Huczynski, 2017). Additionally, prior research has found that mastery feedback increased several types of self-efficacy (Beatson, Berg & Smith, 2018) and aids learning when trainees strive towards achieving well defined tasks (Eppich, Hunt, Duval-Arnould, Siddall & Cheng, 2015).

Various literature on goal orientations, goal orientation-responses and performance-oriented (PODF) versus mastery-oriented (MODF) feedback reactions (VandeWalle, 1997; Johnson, Perlow & Pieper, 1993; Dierdorff, Surface & Brown, 2010; Kozlowski et. al 2001; Gladding, Gutmann, Schroeder & Stelzer, 2015; Beatson, Berg & Smith, 2018), suggests that those receiving MODF in contrast to PODF, should be more likely to react positively towards the training in general, thus also the feedback. PODF is therefore generally expected to generate less positive emotional responses due to the evaluating nature of the feedback integral to provoking performance orientations. Mastery feedback has also proven to be more effective for promoting learning than immediate, corrective feedback, even when combined with possibilities for mass trials to achieve correct answers during an experiment using online learning (Gladding, Gutmann, Schroeder & Stelzer, 2015).

However, contradicting some of the research above, instant feedback in training scenarios is found to be perceived as highly helpful by trainees, in addition to generally improving the quality of exercises for learning and helping trainees to improve during the task they are engaging in (Ali, Pelletier & Shields, 2017). Instant feedback has been found to be effective in improving communication skills and was rated highly by trainees, consistently rating it as among the highest yield activities of the program (Ali, Pelletier & Shields, 2017, p. 341). Research has also generally shown that instant feedback is superior to delayed feedback during learning (Scheeler, McKinnon & Stout, 2012), arguably because it provides learners with opportunities to change behaviors while practicing, instead of erring repeatedly until they receive feedback after the activity (Stahl, Sharplin & Kehrwald, 1997; Goodman, Brady, Duffy, Scott &

Pollard, 2008). For some professions, there has been a shift in the educational paradigm where students are now assessed based on longitudinal observation, and some argue for the need to implement instant feedback to trainees (Brown et al., 2017), arguably fairly easy to implement given today's technology (Scheeler, McKinnon & Stout, 2012; Goodman, Brady, Duffy, Scott & Pollard, 2008). For example, remotely through supervision, or with various forms of automatic pre-recorded, pre-written, or pre-installed responses, such in the present simulator.

This may challenge the applicability of the aforementioned theories favoring mastery type of feedback, as the performance-feedback is delivered instantly through game-elements such as points, badges and scores which has proven to induce many positive responses (Cooper et. al., 2018; Seaborn & Fels, 2015; Landers, 2014). On one hand, PODF is theoretically associated with several negative outcomes and should induce more negative perceptions than MODF but is provided with game-elements, and in a more preferable time frame for trainees which is shown to provoke positive reactions in trainees. On the other hand, MODF is shown to induce positive emotions and lead to more favorable outcomes than PODF, but is delayed in response, not given to trainees until after the training. This can reduce fairness perceptions and also hamper perceptions of its usefulness, as its content might surprise trainees since they are given less direction on the level of their performance during the simulation, which leads us to the next concepts relevant for this thesis.

2.4 *Perceived feedback fairness and relevance of PODF and MODF*

2.4.1 Perceived feedback fairness

Over the last three decades, the concepts of justice and fairness have become increasingly evident constructs (Colquitt, 2001; Kumar, Bakhshi, & Rani, 2009). While justice reflects the perceptions of following rules that is appropriate for the decision-making context, fairness reflects a more global perception of appropriateness that is underpinned by the term justice (Colquitt & Zipay, 2015). The literature has become a theory rich area in organizational psychology and behavior, and the concepts are considered by employees to be among the most prominent issues in organizational life, affecting important behaviors such as turnover, leader member exchange (Cohen-Charash & Spector, 2001), collaboration, engagement, employee actions and several other work related

behaviors and attitudes (Colquitt & Zipay, 2015; Reynold & Helfers, 2018; Sparr, 2008). Influenced by employee emotions (Brienza & Bobocel, 2017), the degree of justice perceptions varies based on certain factors such as the way in which the job is organized or characteristics of the task (Reynolds & Helfers, 2018) that may be evaluated and perceived by the employees as just-, or unjust. It is therefore likely that receiving different types of feedback may provoke certain emotional and cognitive responses in the trainees and thus influence fairness perceptions of the feedback.

While the literature has tended to consider justice and fairness as one compatible construct, for this thesis, and in line with the work of Colquitt & Zipay (2015), the emphasis will be placed upon fairness perceptions, and treat the justice dimension of the term as more of a more implicit, underlying factor in shaping fairness perceptions of the feedback. The underlying justice dimension is the agreement with what factors that are included and excluded when generating the message communicated in the feedback, whilst the sub sequential positive reaction to the feedback in terms of its appropriateness is the more explicit fairness dimension. The understanding of fairness in the present study is therefore: If one generally agrees with information provided in the feedback that one receives on some task performance, such as regarding how it reflects one's efforts exerted into the task, and the feedback does not lack relevant details, nor includes irrelevant ones in the formulation and provision of feedback, one has high perceptions of the feedbacks fairness (Buchanan & Huczynski, 2017; Colquitt & Zipay, 2015; Sparr & Sonnentag, 2008). This means that if the trainees perceive the digitized feedback as reflective of their effort in the simulation task, and they perceive the feedback to originate from accurate information, and be based on unbiased procedures in the simulator, the trainees will report high fairness perceptions.

Positive feedback fairness perceptions have been found to be positively related to well-being-, and under the right conditions promotes positive behavior at work (Sparr, 2008). Further, to foster willingness to reciprocate the feedback with positive behavior in line with social-exchange theory (Blau, 1964), in addition to having the potential to increase personal initiative and innovative behavior (Sparr, 2008) and apply more efforts towards a task (Roberson & Stewart, 2006). Perceiving feedback as fair is shown to cause individuals to think

highly of the provider of the feedback, increasing feelings of trust towards, and perception of rightful authority in the provider of the feedback (Colquitt & Zipay, 2015), in our case the simulator providing the feedback based on an underlying, pre-programmed scoring system. Therefore, in order for the trainees to perceive the feedback as fair, they should also trust the pre-installed factors and procedures included in the simulator that the feedback provided is based on.

Feedback is found to be more effective if the feedback source is trustworthy, compared to when the individual does not trust the source (Earley, 1988). This might be due to a social relationship occurring between the computer and the user, as it has been shown that a social relation on behalf of the individual is directed toward the technology itself, rather than the humans behind the technology, i.e. its developers (Chopra & Wallace, 2003). When receiving MODF, the feedback might be perceived as trustworthy, thus fair, due to the detailed, seemingly robust explanations in their performance evaluation, leading to increased levels of confidence in the computer-system. However, since MODF does not give any concurrent directions for improving performance to trainees during the task, only arriving after completion, it might come as more of a surprise to trainees, which might hamper its fairness perceptions.

In regard to PODF, the trainees may question how the computer derives points from their performance, for example what assessment criteria's the scores and tags provided is based on. Hence, the rules the computer uses to base what is regarded as correct or incorrect responses on, may be perceived as vague, therefore lead to a lack of trustworthiness in the source, and lowered fairness perceptions. However, due to the instant and continuous nature of PODF, this might give the trainee a sense of higher degree of influence over the training process important in forming fairness perceptions (Sparr & Sonnentag, 2008) with instant cues that gives them the opportunity to change directions. Therefore, the feedback provided at the end of the simulator should come closer to what is expected from the trainee, reflecting efforts put into the task to a larger degree, and will therefore be perceived as fairer. This might affect perceptions of higher trust and appropriateness, consequentially the extent to which perceptions of fairness arise.

Since the two feedback-types that are provided in our study differ substantially, it is likely that receiving PODF in contrast to MODF will provoke

emotional and cognitive responses, affecting the trainee's perceptions of fairness differently. However, despite their dissimilarities, we suspect that both groups will report positive fairness perceptions. This assumption is based on the nature of the feedback types, as PODF includes gamified elements, which as mentioned is associated with several positive outcomes, combined with being provided immediately. This presents individuals with immediate directive cues. Further, MODF, being positively angled feedback, inducing mastery-oriented behavior with descriptive, information-rich feedback giving justification of the trainee's performance. In addition, we expect that both feedback types will induce positive reactions in the form of high perceptions of fairness, as individuals are generally found to seek out feedback in new and uncertain situations, and performance situations (Ashford, 1986). Thus, we expect trainees to perceive the different feedback types that is provided as fair, and that there is a positive relationship between PODF, and perceptions of feedback fairness, and MODF and perceptions of feedback fairness. We therefore postulate the following hypotheses:

H1: There is a positive relationship between instant performance-oriented digital feedback (PODF) and perceived feedback fairness

H2: There is a positive relationship between delayed mastery-oriented digital feedback (MODF) and perceived feedback fairness.

2.4.2 Perceived feedback relevance

Relevance refers to an individual's perceptions of attraction towards desired outcomes based upon their own goals, motives and values. A sense of relevance may occur when the learning content is perceived to be useful in work contexts or in other practical applications, such as in some part of the individual's life (Keller, 2009; Loorbach, Peters, Karreman & Steehouder, 2015). However, individuals may have multiple competing goals simultaneously, with some more desirable than others, in which they become subjected to prioritization. This is known as goal attainment and goal avoidance, simply put the decision to pursue a goal, or ignore one in favor of another given what it assessed as most important, realistic, desirable etc. (Keller, 2009). The degree of perceived feedback relevance may therefore naturally depend on the individuals goal orientation as information

useful for learning may not necessarily be as useful for achieving high scores or performance-appraisals of others.

Additionally, a sense of relevance may occur when there is a match between the content and personal interests, and when prior knowledge and experience can be related to the content (Keller, 2009). This can be explained through Information Retrieval (IR) theory. Relevance of feedback is viewed as an influential technique in the traditional text-based Information Retrieval (IR) systems, where the individual searches for information in text and images they may see as useful for them. More precisely, it is the process of automatically adjusting existing information using previous relevant information such that it is adapted to the user's information need. During the retrieval process, users subconsciously chooses the visual feature(s) of interest, and the process is interactive between the human and the computer (Rui, Huang, Ortega & Mehrotra, 1998). This means that when receiving digital information, the trainee will automatically connect the information to previous relevant information. Therefore, in order for PODF and MODF to be perceived as relevant, it has to be connected to their goals for the training, and it has to have an applicable value for the trainees. This means that the trainee has to believe that the content of the simulation training, such as the scoring or descriptive feedback they receive, is somehow related and relevant to their work or goals in order for the attraction to be powerful.

This can also be explained through the trainee's perception of training utility. Perceptions of training utility is an individual, and subjective dimension of judgment of the training content, and creates affective, cognitive reactions to the training (Tharenou, 2010; Phillips & Phillips, 2007; Van Eerde, Simon Tang & Talbot, 2008). If the content, i.e. feedback and information given, subjects covered etc., of the training program does not seem relevant to, or as helping one build on existing knowledge, be pertinent to one's work, studies or goals in some way it will be viewed as having low utility i.e. have low relevance. If the trainees do not perceive the training as having high utility and consist of relevant learning content, they will perceive it as having low relevance.

Given the nature of the different feedbacks provided in the simulation, we expect that trainees will have troubles completely disconnecting the feedback from the content of the simulator. Thus, we expect trainees to evaluate the

feedback in light of the holistic experience they have had with the simulator. As PODF and MODF differ from each other in several ways discussed above, we suspect some differences in perceptions of relevance between groups, however as a whole we expect also here a positive relationship between the feedback given in both groups, and relevance.

High relevance perceptions are also expected to occur given the breadth of the implications of practicing so-called people-skills, or soft skills (Parlamis & Monnot, 2019), through receiving feedback on something we postulate is an area of consented importance for most people in various degrees, but not limited to certain professions or other demographics. Most people experience conflict, and have felt the necessity to address difficult situations or engage in difficult conversations, thus, the feedback will feel relevant as it is easily connected to participants existing experiences, knowledge or lives, hopefully adding to their holistic frames of reference in various forms of social engagement (Buchanan & Huczynski, 2017). In sum, we therefore expect a positive relationship between PODF and MODF and feedback relevance.

H3: There is a positive relationship between instant performance-oriented digital feedback (PODF) and perceived feedback relevance

H4: There is a positive relationship between delayed mastery-oriented digital feedback (MODF) and perceived feedback relevance

2.5 *Self-efficacy*

A construct expected to influence trainees' perceptions of the simulation feedback is self-efficacy, - the belief in one's own abilities and resources to perform a certain task and actively achieve given goals by effortfully attempting to do so (Bandura, 1977; Silver, Mitchell & Gist, 1995; Brown, Ganesan & Challagalla, 2001; Maddux, 2002). Individuals tend to engage in behavior they believe they can manage, and are more likely to pursue goals, actions and strategies that are within their capabilities than those that seems to exceed them (Maddux, 2016). Self-efficacy was first introduced by Bandura in 1977 as a conviction that one can successfully execute certain behaviors in order to "produce" pre-defined outcomes. It is recognized as part of social cognitive theory (Bandura, 1986) a social-psychological theory, contributing to explaining human actions through

combining the polarized perspectives in the nature vs. nurture debate (Gander, 2003; Cooper, 2010). Bandura (1986) suggests that a series of human, cognitive capabilities for reflection is decisive for individual's knowledge acquisition, and the specific experiences and observations a person makes of the external environment (nature), and how this person reasons around them using these specifically human capabilities (nurture) is an important predictor of learning and future behavior. People for example observe and process the behaviors of others, and how others deal with specific events in order to create cognitive models, or patterns of behavior that are suitable to apply to different situations in order to reach some outcome.

Self-efficacy is recognized as important for several performance outcomes such as academic performance (Wirawan & Bandu, 2016) and training performance (Karl, O'Leary-Kelly, & Martocchio, 1993). Self-efficacy and goal orientation are found to affect in-training performance and are also found to be influenced by characteristics of the training design. Some researchers even suggest facilitating for trainees to experience early training success in order for them to gain confidence in their own abilities and enhance self-efficacy to optimize the individual training process (Kozlowski et al., 2001). A link between self-efficacy and self-monitoring activities during training is also drawn such that higher self-efficacy is related to increased ability towards assessing one's own performance, adapting and guiding oneself during practice and recognizing what is necessary to do next, based on current levels of acquisition (Kozlowski et al., 2001). Thus, we expect high self-efficacy in our experiment to be related to high perceptions of feedback fairness and relevance, as individuals with high self-efficacy will be better at evaluating their own progress and performance and following the cues they receive during the simulation, adapting their performance and behavior accordingly. Therefore, we suggest the following hypothesis:

> H5: There is positive relationship between individual self-efficacy and (a) perceived feedback fairness and (b) perceived feedback relevance.

Self-efficacy has also been found to moderate the relationship between goal orientation and learning (Watson et al., 2013; Dierdorff, Surface & Brown, 2010), and the effects of feedback type (MODF vs PODF) on the performance

dimension addressed in the feedback (Johnson, Perlow & Pieper, 1993). Other research has also found support of self-efficacy being an important interactor with goal orientation when seeking to predict individual learning outcomes, as negative effects of certain performance-orientations appear to be negated by high self-efficacy (Dierdorff et. al. 2010; Payne, Youngcourt & Beuabien, 2007). Dweck & Leggett (1988) suggest that potential negative effects of performance-orientation are most likely present when trainees experience low confidence in their own capabilities. Also, in a study of feedback responses which examined student reactions to receiving grades, students with high self-efficacy were found to be less likely to feel anger when receiving unsatisfactory grades, and in addition were less likely to personalize the grades they received (Ackerman & Gross, 2018). Thus, high self-efficacy in individuals might also reduce the impact of receiving negative feedback. Lessening the extent to which individuals perceive negative feedback as a reflection of their capacity as individuals somehow, therefore protecting them from strong emotional responses such as anger or despair (Ackerman & Gross, 2018; Ashford, Blatt, & VandeWalle, 2003).

It has been shown that individuals do not have one uniform self-efficacy which they apply to all situations in which they need to perform. When one experiences success and skill acquisition in a certain arena, say general computer usage, one increases the perception of self-efficacy in that specific area (Bandura, 1977; Bandura, 1986; Nielsen, Makransky, Louison Vang & Dammeyer, 2017). Intuitively, this might impact how one reacts to various situations using computers in the future, and as confidence increases in one's capabilities one likely becomes more self-reliant, thus less dependent on the help of others, or other sources which might provide direction when using computers, for example feedback provided by a computer such as PODF or MODF. However, when one has low perceptions of self-efficacy in some area one is probably more likely to seek out the help of others or look for help in external cues or sources of assistance, increasing susceptibility towards feedback. This postulate does have some empirical support; in an organizational context those with longer tenure are found to express several dimensions related to self-efficacy, such as being more secure, better at judging for themselves when they are in need of assistance, i.e. feedback, and better at evaluating when they are likely going to perform well and

not, which leads to a devaluation of feedback, resulting in seeking it less (Ashford, 1986).

However, more recent research rejects the relation between high self-efficacy and less feedback seeking (Dimotakis, Mitchell & Maurer, 2017) as individuals expressing high self-efficacy in their ability to develop and improve, are prone to be seek more feedback. This is arguably a rather universal form of self-efficacy, which should have implications in several different situations and areas of life. Feedback is separate from other information one receives in how it is directly related to one self (Ashford & Cummins, 1983), thus important for individuals and can lead to strong emotional responses. It is therefore probable that having low self-efficacy will lead individuals to expect receiving poor feedback, thus be less positive to seeking it out, and being more negative to it in general as it is more threatening to their confidence compared to those individuals who have high self-efficacy (Dimotakis, Mitchell & Maurer, 2017). Feedback can then be related to increased levels of stress, and expectations of other negative individual perceptions and experiences such as loss of ego, or self-image (Ashford, Blatt, & VandeWalle, 2003; Dimotakis, Mitchell & Maurer, 2017).

Individuals with low expectations in fact do seek less feedback than those with high expectations (Northcraft & Ashford, 1990), and confident individuals are more likely to seek out performance evaluating feedback (Anseel et al., 2015). Low self-efficacy might therefore create a selective perception in trainees, leading them to more or less subconsciously highlight negative elements of the feedback, disregarding the positive in the process (Buchanan & Huczynski, 2017). This may negatively impact the general perception of the feedback in those with low self-efficacy, as it will subconsciously direct their perception such that they confirm their already low perception of self-efficacy. This might then impact how they perceive the feedback. An example of this is found in the study of Dimotakis, Mitchell & Maurer (2017), finding tahat negative feedback was significantly related to later low measurements of self-efficacy (p. 1519, 1520, 1521). Showing how feedback is important for, - and can alter perceptions of oneself. Further, those exhibiting low measurements of self-efficacy were also less likely to exhibit feedback-seeking behavior later on, in such, self-efficacy, and prior experience with feedback also altered how participants approached feedback situations, conceivably because of expectations and high threat-perceptions. We therefore

expect self-efficacy to significantly influence the relationship between PODF/MODF and perceptions of feedback fairness and relevance, such that it strengthens the relationship for trainees who are high in self-efficacy and weakens it for those who are low in self-efficacy. Therefore, we also suggest the following hypotheses:

> H6: Individual self-efficacy moderates the positive relationships between instant performance-oriented digital feedback and (a) perceived feedback fairness and (b) perceived feedback relevance such that the positive relationship is stronger when individual self-efficacy is higher.
>
> H7: Individual self-efficacy moderates the positive relationships between delayed mastery-oriented digital feedback and (a) perceived feedback fairness and (b) perceived feedback relevance such that the positive relationship is stronger when individual self-efficacy is higher.

2.6 *Chapter summary*

The conceptual framework with the following conceptual model illustrates the relationship between PODF, MODF and perceptions of feedback fairness and relevance, moderated by self-efficacy. We have derived 7 hypotheses from relevant literature that will be subjected to empirical inspection in order to enlighten the research question in the following chapter.

3 METHOD

This chapter presents the methodology of this thesis. First, an outline of the research strategy and design will be introduced. Then, the characteristics of our sample and sampling procedures will be presented, before moving on to discussing the administration of the simulator in terms of procedures, and the task participants are asked to perform. Thereafter, we will present how the feedback was manipulated, before introducing the analytical strategy and lastly a discussion of ethical considerations and research issues relevant for our study.

3.1 *Research strategy and design*

As the overall aim for this study is to investigate how different digital feedback types received in simulation training may relate to trainees' perceptions of feedback fairness and relevance, and how self-efficacy potentially mitigates the relationship, an appropriate research strategy and design was needed that facilitated accurate measurement, and also took various practical concerns into consideration. The research question, conceptual framework and the 7 derived hypotheses were considered, which led us towards a deductive research approach. In line with quantitative research strategy, we derived our hypotheses from established theory, and they were thereafter subjected to empirical inspection in order to falsify, or confirm them (Brymann & Bell, 2015).

For the purpose of identifying any changes across and between groups on how the instant performance -or delayed mastery oriented digital feedback relates to perceptions of feedback fairness and relevance, and self-efficacy, we found the experimental design to be convenient and appropriate. The experimental design is well suited to study causal relationships and enables causal inferences to be drawn by testing descriptive hypotheses about variables that can be manipulated (Shadish, Cook & Campbell, 2002, p. 14; Brymann & Bell, 2015). For this thesis, manipulating what type of feedback one receives in order to investigate the relationships between the two independent variables PODF and MODF and the dependent variables; feedback fairness and relevance, with self- efficacy as both a dependent variable and a moderator. We therefore carried out a quasi-experimental post-test only design comparing the two treatments, with non-equivalent groups adapted by Shadish, Cook & Campbell (2002). The design is illustrated in the following table:

Table 1:

The quasi-experimental design with two treatments

	Manipulation	Post-test
NR Group 1	X_A	O
NR Group 2	X_B	O

The quasi-experimental design has the same qualities of experimental designs, however, it does not fulfil all the internal validity requirements, such as a lack of randomization of the participants into the different groups (NR = no random assignment) (Shadish, Cook & Campbell, 2002; Ringdal, 2013, Brymann & Bell, 2015). To be able to play through the simulator, the participants needed to be assigned individual access through email, phone number and name, manually administered by Assessit. Therefore, for practical concerns, the participants were non-randomly assigned to one of the two conditions X_A or X_B based on an alphabetical order of last names. This was to have control over the participants in terms of the access-process, distribution of the different conditions and additional follow up work to ensure completion of participation. The list including the participants was counted and split into two groups, NR Group 1 and NR Group 2. NR Group 1 received instant performance-oriented digital feedback (PODF) and NR Group 2 received delayed mastery-oriented digital feedback (MODF). As both groups receive different interventions, they will serve as a control group for each other.

Per definition, the groups are to be considered as non-equivalent. This means that the two groups may possess different qualities within, which implies that we cannot guarantee that any observed variation is actually attributable to the experimental manipulations, and not due to other characteristics that might differ between members of the two groups. Thus, making it challenging to control for other possible interferences or variables that may contribute to explaining any relationships between PODF, MODF and the feedback perceptions (Shadish, Cook & Campbell, 2002; Ringdal, 2013, Brymann & Bell, 2015). After being exposed to the manipulations, the participants received a post-test i.e. O (See table 1). This can be illustrated in the following figure 1:

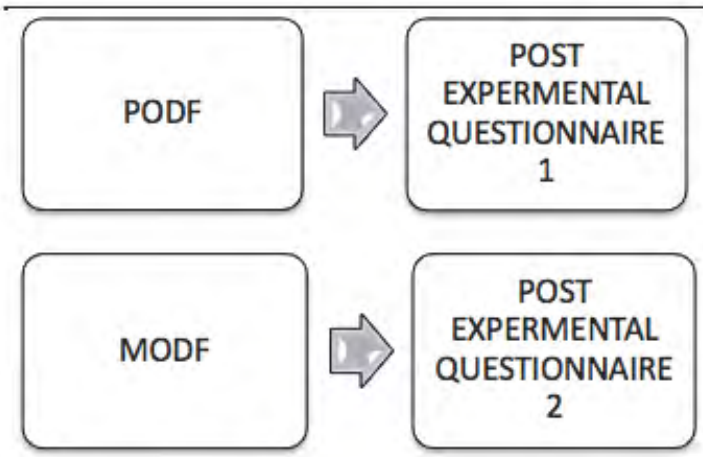


Figure 1: NR Group 1 and 2 assigned to different conditions with following post experimental questionnaire

The post-test consisted of an online questionnaire, tailored to each group's experimental condition, with introductory specification of the digital feedback they received to ensure that they remembered and thought of the feedback when answering the questionnaire. The post-test questionnaire enabled us to capture each respondent's perceptions of the feedback's fairness and relevance, and degree of self-efficacy, in the two different manipulations. Furthermore, it allowed us to control for other possible contributing variables in the groups that might have influenced any observed relationships, namely, age and gender. However, a post-test only design does not allow us to identify any changes in the participants perceptions before and after the manipulation, and whether or not the manipulation made any difference as we have not collected a baseline measurement of feedback perceptions in a pre-test (Cooper, 2010; Bryman & Bell, 2015). Nevertheless, we hope that the introduction phase of the simulator explaining relevant constructs will help equalize any differences in knowledge levels among the participants of the experiment, creating a more equal frame of refence for playing through the simulator amongst all of the participants.

3.2 *Sample*

This study utilizes a sample of n=53 participants; 34, 0 % were male, and 66, 0 % females. The majority of the sample had an age of 24-29 years old (49, 1 %), whilst 26,4 % were 30-35 years old, and 15, 0 % above the age of 36 years old. 43, 4 % of the participants were students, 37, 7 % regular employees and 17,0 % were in a leader position, all of whom were based in Norway. The sample consists of individuals convenience sampled, available to us from our own formal and informal networks. Non-probability convenient sampling is not ideal because it

may compromise the validity and generalizability of the study (Brymann, & Bell, 2015). Nevertheless, the aim in experiments is not necessarily to generalize, due to the constraints placed upon the method in terms of its external validity (Shadish, Cook, Campbell, 2002; Bryman & Bell, 2015). In the present study the aim is not to generalize, but rather to make inferences about any relationships that might occur between the variables we have chosen to investigate. The sampling criteria used in this study is presented below, in no specific order in the table 2:

Table 2:
Sampling selection criteria's

Articulate in Norwegian
Above the age of 18 years
Some familiar with necessary constructs through work or education
Willingness and ability to submerge into roleplay
Administrator access on computer

Since the simulator's programmed language is Norwegian, we required the participants to be articulate in Norwegian to ensure they understood the task, the avatar Hilde and the feedback they would receive. Moreover, to be above the age of 18. Having an age limit may increase the chances of the participants having experience with a leader-subordinate relationship, is familiar with the concept of leadership training and the difficult conversations and thus understands the constructs presented in the case, and throughout the simulator. Additionally, increasing the chances of having the ability to envision and submerge into the role of a leader. Lastly, since the simulator program requires administrator rights to the computer in order to download necessary software, this was by default an absolute condition.

3.3 *Procedure*

We distributed the study to the participants through e-mail. The e-mail contained a short informational letter, in both direct text and attachments, about the simulator such as its design and purposes (Appendix H). It was also informed briefly about the task, given directions on how to download the program and a reminder that administrator rights were needed on their computer. Each group received different links to the simulation program with respective experimental

interventions, in which they had to download to play. The simulation activity was completed in the participants current whereabouts, and they were encouraged to sit somewhere quiet, free of disturbances and to have the sound on. Upon the completion of the task activity, participants were asked to complete a post experimental questionnaire. We conducted the experiment and administered the following online questionnaire from in the Spring of 2019.

3.4 *Task*

For our study we utilized a computerized 3D simulation program developed by Attensi for Assessit with the purpose of evaluating and developing leaders. The simulator is a virtual tool designed to increase insight and knowledge of leader's reactions in unique and real-life situations. The trainee was presented with the task of completing a difficult conversation with a fictive employee "Hilde". The trainee was thereafter presented with a written case description with background information regarding the simulation task in the beginning of the training (see Appendix B). The task of the trainee was to enact the role of a leader in Green Energy Solutions, a company stationed in Germany, with offices in the west coast of Norway. The leader has worked in the company for a few months and has to have a difficult conversation with "Hilde" who has shown deteriorating performance for some time. The trainee was informed that they had to go through 5 phases; 1. Preparation 2. Opening of the conversation 3. Understanding 4. Reciprocity 5. Summary and commitment. Before initiating the game, participants were asked to complete a theoretical introduction to constructs relevant for understanding the task (see Appendix C). In this theoretical introduction phase, they got information on how to move through the different phases and what to focus on.

In preparation for the conversation each trainee, now in character, received information about Hilde through three emails (see Appendix D). The first was from Hilde's closest manager, Christian. The second was from the HR department with a complaint, and the third from her previous manager. The first two emails provided the trainee with negative information about Hilde, while the last mail provided positive information. Based on this information, the trainee then had to set three main goals for the conversation with Hilde before they started. The trainee was then presented with three different alternatives regarding how to

formulate the mail, scheduling a meeting with Hilde where the difficult conversation is set to take place.

The scenario thereafter shifted to a meeting room where the trainee as a leader sits ready and Hilde walks in. The trainee then had to interact with Hilde by choosing amongst different dialogue-options given by the simulator with a range of 2-5 options (see Appendix E). Each connected with one of the four categories "trust and relations", "insight and context", "involvement and structure" and "commitment and motivation". Underpinning these categories are possible scores, and some of the options are more favorable than others. The manuscript and dialogue in the simulator changes according to the choices the trainee makes. When one phase is completed, a visual check mark is shown in the phase-indicator, and a header in front of the game pops up, showing the trainee that they have moved on to the next phase. This continued to the end. The task took approximately between 30 min to 1 hour, depending on the trainee's choices, and how fast they reached the end of the simulation.

3.5 *Manipulation of independent variables*

In the original simulation program, the trainees receive both PODF and MODF. However, in this study the manipulation of the independent variables was done by giving the two groups the different types of digital feedback. The feedback was given in three areas of the game to the group receiving PODF (See Appendix F). First, on the home page with stars indicating the process of completion. Second, was instant feedback given during the game. This is feedback visualized as four barometers in the left top corner under the four categories "trust and relations", "insight and connection", "autonomy and responsibility" and "motivation and commitment". The barometers are connected with tags and points which are given based on the trainee's decisions in the dialogue. The points appear on the screen when the trainee makes decisions, with tags such as for example "+ 100 trust", or "- 50 insight". The third, and last point where they were given feedback was at the end of the game, or if they failed at the beginning. They received a total score of their performance based on these four categories, and their scores in each of the four categories. There was also a visualization of three circles, which showed the amount of possibilities and subsequent use of these possibilities to engage in correct behavior according to the simulator such as "be silent", use "open questions" and how many "insights" were found.

The other group only received MODF, a written digital feedback containing the decisions they made in each step of the simulation activity, and suggestions for improvement (see Appendix G). This type of feedback can appear in two situations. (1) If the trainee "hard fails", meaning that the trainee made multiple mistakes in a row, they will be sent back to the start of the game with descriptive feedback, informing them of ways to improve with the option to start over. Or (2) delayed i.e. at the end of the game. If the trainee goes through the simulation with minor mistakes, the feedback will be descriptive and positively angled, evaluating the trainee's decision and performance in the different phases.

3.6 *Measurement*

Perceived feedback fairness. Fairness of feedback was measured after the simulation activity with a 2 items scale adapted from McFarlin & Sweeney (1992) (See Appendix A). The questionnaire included the items "How fair or unfair are the procedures used to evaluate your performance?" and "How fair or unfair are the procedures used to communicate your performance feedback". Both items rated on a 5-point Likert scale from 1= "very unfair" to 5= "very fair". All items were translated from English to Norwegian. ($\alpha = 0.89$)

Perceived feedback relevance. Relevance of feedback was measured with a 5-item scale (See Appendix A). Four of the items are from the Reduced Instructional Materials Motivation Survey IMMS (RIMMS) by Loorbach, Peters, Karreman & Steehouder (2015), a situational measure of people's reactions to instructional materials in the light of the ARCS model (attention, relevance, confidence and satisfaction) from Keller (2009). The RIMMS is a 12-item scale. For this study, we used three items under the subscale "relevance". However, Huang, Huang, Diefes-Dux & Imbrie (2006) argues that 16 items should be included in the RIMMS, therefore we added one more question to our survey to measure if they perceived the simulator as overall relevant in relation to their daily work tasks. The questionnaire included items such as "The content of the feedback will be useful to me" and "The content of the feedback is relevant to me". All items were rated on a 5-point Likert scale from 1= "strongly disagree" to 5= "strongly agree". All items were translated from English to Norwegian. ($\alpha = 0.83$)

Self-efficacy. Self-efficacy was measured with a 4-item scale (See Appendix A) adapted from Schwarzer & Jerusalem's (1995) Generalized Self-Efficacy Scale, and contains items such as "It is easy for me to stick to my aims and accomplish my goals" and "If someone opposes me, I can find the means and ways to get what I want.". All items will be rated using a 5-point Likert scale from 1= "strongly disagree" to 5= "strongly agree". All items were translated from English to Norwegian. *(*α = 0.65)

Control variables. We controlled for the demographic variables age and gender (see Appendix A). Age and gender are used to make sure we have adequate variance in our sample and may also provide us with insight into its composition that might prove important depending on the result, i.e. if the composition theoretically should influence the results. All items were translated from English to Norwegian.

3.7 *Analytical strategy*

The analytical process in this thesis consisted of 5 steps. The first step was to prepare the data for analysis. This included; renaming each unit to be able to identify which condition they were exposed to, and creating a condition value for each group, PODF= 0 and MODF=1. Additionally, creating new labels for the variables and making sure that they were coded at the proper scale for analysis. Further, coding self-efficacy into dichotomous variables with all values above the mean of 3.85 coded as 1 (high) and all below 3.85 coded as 0 (low). Lastly, we ensured that we did not have any missing values in our data set that might have affected our analysis, in which there were none. The second step consisted of reliability testing i.e. checking the consistency of the measurements of our constructs. For this purpose, we used Cronbach's alpha, a test of internal reliability that estimates how closely related a set of items on a test are. The general rule is that for most purposes the alpha of a test should surpass 0.70 (Brymann & Bell, 2015) a rule we also used.

The third step consisted of performing a principal component analysis for the purpose of data reduction (Raykov & Marcoulides, 2011). This was to make decisions regarding item retention, to identify measures with factor loadings below 0.50 on the target construct (Ringdal, 2013) that potentially needed to be excluded in the computed scales. To identify any cross loadings, we performed a principal component analysis using Equamax rotation, a form of orthogonal

rotation method which is a combination of the Varimax and Quartimax method that simplifies the interpretations of the factors and variables included (Allen, 2017). The aim was to find which items that made up each factor, and whether we had any cross loadings that might indicate overlap, in which items designed to measure different constructs are explained by the same underlying factor (Cooper, 2010). When all factors were identified, the measures loading higher than 0.50 on the target construct were computed into constructs, namely; fairness, relevance, and self-efficacy.

The fourth step was to conduct a descriptive analysis of means and standard deviations to observe the variance in our data. Additionally, to perform a correlation analysis to identify whether any of the variables where correlated. The fifth and last step was to run a MANOVA- analysis, a multivariate analysis of variance, that allows us to test hypotheses that include several independent and dependent variables (Warne, 2014). This statistical technique was deemed as suitable for this analysis as we have two independent and two dependent variables, and a hypothesized moderator variable.

3.8 *Ethical concerns*

There are some ethical concerns that need to be discussed and considered in regard to proper conduct of the quasi-experiment in this thesis. This section will outline how we dealt with concerns regarding potential harm to participants, informed consent and deception, as well as privacy and data management. Prior to the data collection, the planned study was notified to the Norwegian Centre for Research Data (NSD) and approved.

3.8.1 Potential harm in our experiment

Problems with the ethicality of experiments may arise given the nature of the method that might cause potential harm to the participants. In this thesis, the main issue considered as potentially harmful to participants, were harm to self-esteem or causing them stress by measuring their performance (Brymann & Bell, 2015). The performance measuring element in the simulator itself may cause stress, especially if one does not clearly understand the task, and this potential source of harm was deemed too likely by greater for those in the MODF condition, as they did not receive any instant feedback. However, the feedback is considered as not abusive in either group. It is generally positively angled in the MODF condition,

and the performance indicators in the PODF condition does not provide explicit grounds for comparison by providing a maximum value. Furthermore, the manipulation was only a minor adjustment of the feedback and we believe the participants were not subjected to anything that is likely to cause any emotional distress or side effects.

3.8.2 Informed consent and deception

The issue of informed consent concerns whether the participants in this study were properly informed in order to make the decision of whether or not to participate (Brymann & Bell, 2015). Prior to this study the participants were given two information letters, one included information regarding the details of the simulator. The other included a consent form with the purpose of the study, the responsible parties, the reason for requesting participants, privacy and data concerns, voluntary participation, in addition to their rights to withdraw from the experiment at any time. They were also provided with contact information in case of questions or concerns arising after the study. However, exact details of the purpose, the research process or the manipulation were not provided to the sample, as this could have jeopardized our experiment. For example, priming the participants, resulting in experimental effects, such as deliberately altering behavior according to what is socially desirable, or altering participants perceptions during the simulation (Brymann & Bell, 2015). The participants were however not led to believe anything untrue about the simulation, thus our experiment did not utilize deception, merely withholding information to obtain natural responses to the experimental conditions.

3.8.3 Privacy and data management

The privacy and data management section concern the degree to which invasion of privacy may be condoned (Brymann & Bell, 2015). This means only collecting data that is necessary for completing this study, in addition to proper handling of the data when it has been collected. The data required for this study were names, telephone number and e-mails in order to give access to the simulator and distribute the software, i.e. the simulator. Since this is information easily accessible, the data collected was not considered as highly sensitive. However, to ensure confidentiality, the data was kept secure on a password safe location only accessible for us and Assessit and was deleted upon completion of the experiment.

Additionally, data regarding age and gender as control variables, and the participants feedback perceptions and degree of self-efficacy was required. The collection of information about these subjects is more sensitive. However, to ensure anonymity Assessit coded each participants' name before delivering the data material to us, making it difficult for us to connect information to individuals. To ensure anonymity and confidentiality prior to data collection, a confidentiality agreement between all the parties handling the data was signed. This agreement included the safe-keeping of data on a secure location, prohibited sharing of information with unrelated parties, anonymity of data and the timeline of withholding of the data.

4 RESULTS

This chapter presents the results of the analysis in this thesis. First, results from the factor analysis will be presented. Second, descriptive statistics, and lastly results from the MANOVA-analysis where we test our hypotheses.

4.1 *Principal component analysis*

The first principal component analysis of the self-report measures revealed one item measuring self-efficacy *"If someone opposes me, I can find the means and ways to get what I want*", had a low factor loading of .083, and was consequentially eliminated from our data for further computing and analysis. This led to overall higher loadings on the remaining items on to the construct self-efficacy in addition to a higher Cronbach's alpha level of $\alpha = 0.65$.

The principal component analysis with Equamax rotation (see Appendix I) showed that both of the two measures of perceived fairness loaded onto the target factor with both loadings above .50, accordingly, was computed into the fairness construct. The analysis also showed that all five measures of perceived relevance loaded onto the target factor, with loadings above .50. The scale of relevance was therefore computed with all five measures. Lastly, the analysis showed that the four remaining items measuring self-efficacy loaded onto the target construct with factor loadings above .05, therefore it was computed into self-efficacy.

4.2 *Descriptive statistics*

We have presented the means, standard deviations, alphas and correlation of the central variables in Table 3. The bivariate correlations indicate that age was not significantly correlated with either fairness ($r = .04$, $p > .05$) relevance ($r = -.09$, $p > .05$) nor self-efficacy ($r = -.19$, $p > .05$). Gender did not significantly correlate with either fairness ($r = .23$, $p > .05$), relevance ($r = .14$, $p > .05$), nor self-efficacy ($r = -.12$, $p > .05$). However, self-efficacy did correlate with relevance ($r = .42$, $p < .01$).

Table 3:

Means, standard deviations, alpha reliabilities and correlation among variables

Variables	Means	S. D.	Alpha	1	2	3	4	5
1. Age[a]	2.55	1.03	n. a	--				
2. Gender[b]	0.66	0.47	n. a	-.08	--			
3. Fairness	4.00	0.55	0.89	.04	.23	--		
4. Relevance	4.06	0.58	0.83	-.09	.14	.42**	--	
5. Self-efficacy	3.85	0.53	0.65	-.19	-.12	.02	.42**	--

Notes: S.D.= Standard deviation

[a] Age was classified into five classes: 1 = 18-23, 2 = 24-29, 3 = 30-35, 4 = 36-41, and 5 = 42 or older

[b] 1 = Female, 0 =Male

[e] n = 53

*p < .05, **p <.01.

In Table 4 we have presented means and standard deviations for each condition. There were two conditions in this sample, PODF and MODF, with 25 participants in the PODF condition, and 28 in the MODF condition. The average age of participants in both conditions belonged in the 24-29 category. In both the PODF and MODF conditions there were more female than males, with respectively $M_{[PODF]}$= 0.64, SD= 0.49, and $M_{[MODF]}$ = 0.68, SD= 0.47. For the group receiving the PODF condition, $M_{[Fairness]}$ =4.16, SD = 0.45, and $M_{[Relevance]}$ =4.15, SD = 0.62. For the group receiving the MODF condition, $M_{[Fairness]}$ =3.87, SD = 0.60, $M_{[Relevance]}$ = 3.98, SD= 0.54.

Table 4:

Means and standard deviations for each condition with variables

	PODF			MODF		
	Fairness	Relevance	Self-efficacy	Fairness	Relevance	Self-efficacy
N	25	25	25	28	28	28
Mean	4.16	4.15	3.78	3.87	3.98	3.91
S.D.	0.45	0.62	0.61	0.60	0.54	0.45

Notes: S.D.= Standard deviation

4.3 *Testing of hypotheses*

We performed multivariate analysis of variance (MANOVA) to test our 7 hypotheses—controlling for age and gender. In hypothesis 1 we predicted that there would be a positive relationship between instant performance-oriented digital feedback (PODF) and perceived feedback fairness. Results from the MANOVA analysis (see table 5) showed that the direct effect of instant PODF on perceptions of feedback fairness was not significant (F [1, 53] = 3.260, $p > .05$). Hypothesis 1 was therefore not supported. In hypothesis 2 we predicted that there was a positive relationship between delayed mastery-oriented digital feedback (MODF) and perceived feedback fairness. The MANOVA analysis (see table 5) showed that the direct effect of delayed MODF on perceived feedback fairness was not significant (F [1, 53] = 3.260, $p > .05$. Hypothesis 2 was therefore not supported

In hypothesis 3 we predicted that there was a positive relationship between instant performance-oriented digital feedback (PODF) and perceived feedback relevance. The result from the MANOVA analysis (see table 5) showed that the direct effect of the instant PODF condition on perceptions of feedback relevance was not significant (F [1, 53] = 1.587, $p > .05$). Hypothesis 3 was therefore not supported. In hypothesis 4 we postulated that there is a positive relationship between delayed mastery-oriented digital feedback (MODF) and perceived feedback relevance. The results from the MANOVA analysis (see table 5) showed that the direct effect of the experimental condition delayed MODF on the perceptions of feedback relevance was not significant (F [1, 53] = 1.587, $p > .05$). Hypothesis 4 was therefore not supported.

Table 5:

Relationship between PODF, MODF and perceptions of feedback fairness and relevance

	Perceived feedback fairness				
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Condition	.934	1	.934	3.260	.077
	Perceived feedback relevance				
Condition	.436	1	.436	1.587	.214

Notes: Condition= PODF and MODF

$^{*}p < .05, ^{**}p < .01$.

In hypothesis 5 we predicted that there was a positive relationship between high individual self-efficacy and (a) perceived feedback fairness and (b) perceived feedback relevance. The MANOVA (see table 6) showed that the direct effect of high self-efficacy on (a) feedback fairness perceptions was not significant (F [1, 53] = 0.40, $p > .05$). However, the direct effect of high self-efficacy on (b) perceptions of feedback relevance was significant (F[1, 53] = 14.451, $p < .01$). Hypothesis 5 was therefore partially supported

Table 6:

Relationship between self-efficacy and perceptions of feedback fairness and relevance

	Perceived feedback fairness				
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Low vs. High Self-efficacy	.011	1	.011	0.40	.842
	Perceived feedback relevance				
Low vs. High Self-efficacy	3.965	1	3.965	14.451	.000**

$^{*}p < .05, ^{**}p < .01$.

In hypothesis 6 we predicted that individual self-efficacy moderates the positive relationships between instant performance-oriented digital feedback and (a) perceived feedback fairness and (b) perceived feedback relevance such that the positive relationship is stronger when individual self-efficacy is higher.

The results indicated that in the group receiving instant performance oriented digital feedback, (a) perceived fairness was statically indifferent among trainees with higher self-efficacy ($M_{[Fairness]}$ =4.25, SD = 0.50) and trainees with lower self-efficacy ($M_{[Fairness]}$ = 4.04, SD = 0.35) (F[1, 53] = 0.882, $p > .05$). The results also indicated that in the group receiving instant performance oriented digital feedback, (b) perceived relevance was statically indifferent among trainees with

higher self-efficacy ($M_{[Relevance]}$ =4.42, *SD* = 0.62) and trainees with lower self-efficacy ($M_{[Relevance]}$ = 3.80, *SD* = 0.42) (F[1, 53] = 0.005, p > .05) (See table 7, figure 2 and 3). Hypotheses 6 was therefore not supported.

In hypothesis 7 we predicted that individual self-efficacy moderates the positive relationships between delayed mastery-oriented digital feedback and (a) perceived feedback fairness and (b) perceived feedback relevance such that the positive relationship is stronger when individual self-efficacy is higher. The results indicated that in the group receiving delayed mastery-oriented digital feedback, (a) perceived fairness was statically indifferent among trainees with higher self-efficacy ($M_{[Fairness]}$ =3.78, *SD* = 0.44) and trainees with lower self-efficacy ($M_{[Fairness]}$ = 4.00, *SD* = 0.76) (F[1, 53] = 0.882, p > .05). The results also indicated that in the group receiving delayed mastery-oriented digital feedback, (b) perceived relevance was statically indifferent among trainees with higher self-efficacy ($M_{[Relevance]}$ =4.17, *SD* = 0.38) and trainees with lower self-efficacy ($M_{[Relevance]}$ = 3.73, *SD* = 0.64) (F[1, 53] = 0.005, p > .05) (See table 7, and figure 2 and 3). Hypotheses 7 was therefore not supported either.

Table 7:

Self-efficacy as a moderator of PODF and MODF and perceptions of feedback fairness and relevance

	Perceived feedback fairness				
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Interaction	.252	1	.252	.882	.353
	Perceived feedback relevance				
Interaction	.001	1	.001	.005	.942

Notes: Interaction= The interaction effect of self-efficacy as moderator with conditions

$^{*}p < .05$, $^{**}p < .01$.

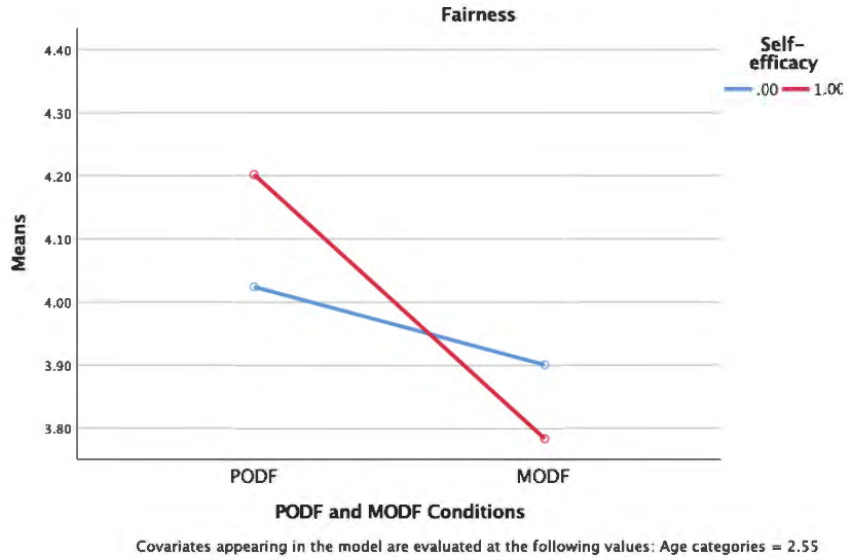


Figure 2: The relationship between PODF, MODF and self-efficacy on perceptions of feedback fairness.

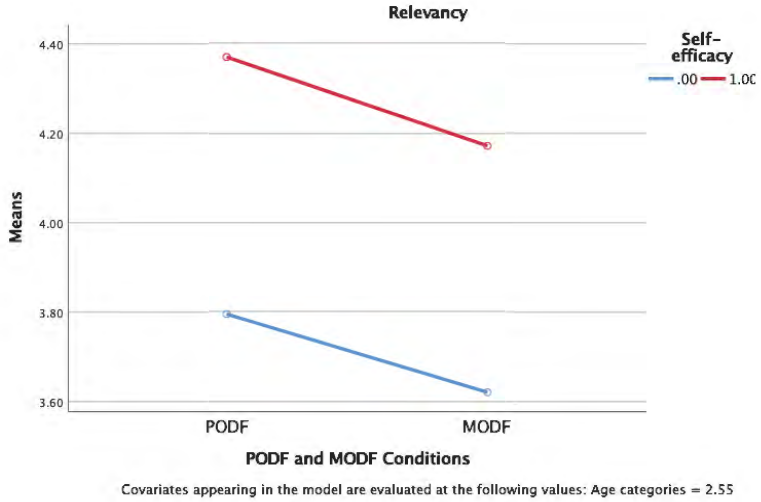


Figure 3: The relationship between PODF, MODF and self- efficacy on perceptions of feedback relevance.

5 DISCUSSION

This chapter presents the discussion of results and theory in this thesis. First, a short summary of the results from our analysis will be presented, before the results in light of theory will be discussed. Thereafter some practical implications of this study will be mentioned, before lastly, providing an overview of the key limitations to this study will be presented with future research directions.

5.1 *Discussion*

At the outset, how feedback delivered through a digitized training platform may be received by individuals led us to question whether performance-, vs. mastery-oriented digital feedback would lead to positive perceptions of feedback in individuals during task performance. These two forms of feedback are theoretically different, and we sought to extend the understanding of the relationship between different types of feedback, and feedback perceptions, by investigating how the intertwined role of individual differences in self-efficacy influenced the relationship.

We generally received little to no support of our hypotheses in this study. Hypothesis 1 through 4 predicted the expected relationships between instant performance, - and delayed mastery-oriented feedback, and fairness and relevance perceptions of the feedback, and did not achieve statistical significance. However, the direct relationship between self-efficacy and perceptions of feedback fairness and relevance predicted in hypothesis 5 received partial support, as there was only a significant relationship between self-efficacy and relevance. The moderating role of self-efficacy on the studied feedback perceptions during the different experimental conditions predicted in our last two hypotheses, 6 and 7, did not receive statistical support.

5.1 *Theoretical implications*

We find the lack of empirical support that we received in this study interesting, showing that there are several practical considerations and unexpected, confounding factors that derails the expected turn of events that arises on the basis of theory. This thesis does neither confirm of reject the established theories presented, nor adds to the already existing paradigm of theoretical insights into the different reactions that performance, - and mastery-oriented digital feedback may provoke due to a lack of significant findings. Despite not adding any new

discoveries of causality, it may provide several novel combinations of postulated, theoretically credible relations between the variables included.

Despite the lack of significant findings supporting our suggested causal relationships, and subsequent verifying of interrelations between the variables involved in our experiment, we believe our expectations had a solid basis in relevant theory. As such, we did observe some interesting patterns in parts of our data. Based on a comparison of means and standard deviations in the different conditions, our data showed that instant performance oriented digital feedback (PODF) was perceived as fairer and more relevant compared to receiving delayed mastery oriented digital feedback (MODF) as the former type had slightly higher means than the latter. We speculate whether this could stem from the operationalization of the two experimental conditions, PODF and MODF. It may be that since PODF was instant, this was what primarily led to higher mean perceptions for trainees in this condition, compared to the delayed MODF. The instant feedback may have facilitated for the trainees to change behaviors during the simulation training (Stahl, Sharplin & Kehrwald, 1997; Goodman, Brady, Duffy, Scott & Pollard, 2008), which might have led to higher fairness and relevance perceptions. The trainees could have felt they were more able to adjust their strategies and choices during task performance, in contrast to those receiving MODF. This may have positively impacted fairness perceptions among those receiving PODF, as being more able to adjust strategies, made them feel more responsible for the results obtained, thus feel like the feedback accurately reflected the efforts they exerted into performing the simulation task (Sparr & Sonnentag, 2008). This could however have happened regardless of form i.e. performance-, or mastery-oriented feedback, such as assumed on the basis of theory, if either form was provided instantly as concurrent feedback (Buchanan & Hucsynzki, 2017).

Moreover, in light of IR theory (Rui, Huang, Ortega & Mehrotra, 1998), as PODF was instant the trainees might have perceived the performance indicators in the feedback as more useful, i.e. relevant, aiding them to successfully complete the task. The game elements included in PODF may also be an important influencer of these results in terms of cuing and directing the trainees during the simulation activity as the game elements introduced something immediately

recognizable (Seaborn & Fels, 2015; Landers, 2014), that might have led to higher relevance perceptions of instant PODF, compared to delayed MODF.

In regard to the direct relationship between self-efficacy and feedback perceptions, our results indicate that individuals with high-self efficacy are more likely to perceive feedback as more relevant. Studies have found individual self-efficacy to relate to positive attitudes towards feedback (Dimotakis, Mitchell & Maurer, 2017), possibly stemming from higher confidence in the frugality of the feedback for individual outcomes such as learning and performance. This corresponds well with our expectation that self-efficacy would be positively related to relevance, as it is likely that those with high self-efficacy will have an easier time matching content to learning-goals,- and interests, as they will likely be more confident in their ability to take advantage of the feedback-content (Keller, 2009).

Regarding the hypothesized strengthening of the relationship between PODF, MODF and fairness and relevance perceptions when self-efficacy is high, no significant effect was yielded, however the patterns in figure 2 may indicate that those reporting high individual self-efficacy receiving PODF expressed higher perceptions of feedback fairness, whilst those reporting high self-efficacy receiving MODF expressed lower perceptions of fairness. Since efficacious individuals are more prone to seek feedback (Dimotakis, Mitchell & Maurer, 2017), receiving PODF may have led the trainees to experience a heightened sense of learning whilst simultaneously satisfying their need for feedback. This might shed light on what caused the observed patterns appearing in figure 2, indicating that they perceived the feedback as fairer when they got the opportunity to adjust their strategy, by receiving feedback concurrently.

Moreover, those reporting low individual self-efficacy receiving PODF expressed higher perceptions of feedback fairness than those reporting low self-efficacy receiving MODF. However, those reporting high self-efficacy receiving MODF had lower fairness perceptions compared to those reporting low self-efficacy who received MODF, according to figure 2. A possible explanation for the low ratings of feedback fairness belonging to efficacious individuals receiving MODF, is that they are more eager to receive feedback given their heightened belief in feedback as important for performing and learning (Dimotakis, Mitchell & Maurer, 2017). It is possible that they found themselves disappointed with

receiving the delayed feedback, as it did not provide them with the opportunity to adjust their task performance, and learn whilst maneuvering through the simulator such as when receiving instant feedback, shown to increase feelings of learning during training (Ali, Pelletier & Shields, 2017). Another possibility is that the trainees felt disappointed with the content of the feedback received in the end, as regardless of the positive angling of MODF, as the efficacious individuals might have consistently over-assessed how well they performed. Therefore, they might have experienced a discrepancy between the delayed MODF and their own subjective assessment of how they performed, resulting in lowered trust and fairness perceptions of the feedback in this condition.

Additionally, our analysis also unveils some interesting patterns in figure 3, such that the trainees reporting high self-efficacy in both PODF and MODF conditions might have expressed higher perceptions of feedback relevance, thus seem to look at the feedback as more relevant, compared to those reporting low self-efficacy. Those reporting low self-efficacy however, expressed lower perceptions of feedback relevance across groups. Prior research has linked low self-efficacy to lower interests in feedback (Dimotakis, Mitchell & Maurer, 2017; Anseel et al., 2015), and heightened threat perceptions concerning feedback reception (Ashford, Blatt, & VandeWalle, 2003). Perceptions of feedback relevance were lower for those receiving MODF, both for high and low self-efficacy. In our study, those reporting low self-efficacy might have had a higher prevalence of negative emotions during the simulation, for example experiencing heightened levels of stress, making it harder for them to view the feedback as providing direction, helpful information or cuing during the simulation, instead perceiving it as personal critique (Ackerman & Gross, 2018).

The higher relevance perceptions found among high self-efficacy individuals were however not sensitive to type of experimental condition, i.e. PODF and MODF. Orienting the trainees with high self-efficacy towards performance-, or mastery, did not make a significant difference in measurements of feedback perceptions. A possible explanation could be that efficacious individuals might be less sensitive to types and formulations of feedback, as they have stronger beliefs in their ability to learn from the content (Keller, 2009), creating positive overall reactions to the utility of the simulation training in our study (Tharenou, 2010; Phillips & Phillips; Van Eerde, Simon Tang & Talbot,

2008), and the relevance of the feedback provided, regardless of condition. Feedback is as mentioned information directed specifically at oneself (Ashford & Cummins, 1983) therefore if self-efficacy makes individuals less prone to personalize feedback content (Ackerman & Gross, 2018), it may very well negate negative emotional responses such as anger, stress or weakening of self-image (Ashford, Blatt, & VandeWalle, 2003). As a consequence, making efficacious individuals view performance evaluations such as feedback as not directly reflecting their general capacity to perform, rather as more attributable to one specific performance. If the high self-efficacy segment of our sample did not personalize the feedback, they might have perceived it as more corrective, presenting useful information for them to adapt and apply to relevant situations in the future, i.e. increasing perceptions of relevance in the feedback content.

5.2 *Practical implications*

The lack of significant findings creates difficulties in making any advances in terms of practical implications regarding the included variables and causality in any of our proposed relationships. Yet, a modest indication we can point to is the practical implication of the relative impact on how leaders distribute feedback to employees in the workplace based on their performance, arguably an interesting field to investigate. Specifically, how the distribution of more instant, concurrent feedback on employee's performance in their daily work, for example giving directions or praise might be perceived as fairer and more relevant than the typical annual performance appraisals. It could therefore be more beneficial to distribute instant or continuous feedback to employees, instead of more delayed appraisals in organizations.

Based on the present study, a suggestion of practical value is how the feedback provided in the simulator might be formulated, designed and distributed in order to create engagement and increased fairness and relevance perceptions among employees at work. On one side, including performance indicators might direct focus on proving one's ability in order to gain favorable performance outcomes such the highest possible score, or outcompeting others, however including gamified elements such as points or scores is proven to create engagement in simulation training (Cooper et al., 2018; Mumm & Mutlu, 2011; Hamari, Koivisto & Sarsa, 2014). In addition, instant feedback, gives the trainees the opportunity to change behaviors while practicing their skills (Stahl, Sharplin

& Kehrwald, 1997; Goodman, Brady, Duffy, Scott & Pollard, 2008). On the other side, delivering descriptive, mastery feedback that engages exploratory behavior, is often found to be important in improving learning, and promoting individuals to focus on mastering new knowledge and skill acquisition (Erhel & Jamet, 2013; Johnson, Perlow & Pieper, 1993; Dweck & Leggett, 1988; Dierdorff, Surface & Brown, 2010; VandeWalle, Cron & Slocum, 2001), but is easiest to deliver after the simulation. On theoretical grounds, incorporating both forms of feedback into the simulator should facilitate for the optimal training proficiency. Combining outcomes such as possible higher knowledge acquisition through promoting a mastery focus, with enjoyment from the game elements, and stronger cuing functions during the simulation with a highly specific, descriptive assessment upon completion. We can unfortunately not say for certain, but palpable at least on theoretical grounds, is that one is not as good without the other.

5.3 *Limitations and future research directions*

Our study is not without limitations. A limitation can be seen in regard to investigating our proposed relationship, having no clear target group when sampling, resulting in a sample consisting of a combination of students, employees and leaders belonging to different work sectors, with varying background and degrees of familiarity with the concepts presented in the simulator. This may have differentially influenced the perceptions of the feedback, for example by way of difficulties understanding the task, leading to poorer performance, resulting in lowered feedback perceptions. Future research could investigate the postulated relationships in our study on a sample optimally consisting of leaders only, to ensure they have the necessary background and work experience to understand the concepts relevant for, and tasks given by this specific simulator, as it is developed for leader-assessment.

Our sample is also convenience biased, which might jeopardize the already limited external validity of our experiment. The decision to pursue convenience sampling was made due to lack of participants signing up voluntarily through Assessit's network, in accordance with the initial sampling plan, leading us to decide to engage in convenience sampling at a later stage by using our formal and informal networks. Initially, we were to be given access to an excess of 100 leaders who were going to be obliged to play through the altered simulator in connection with a leadership competition hosted by Assessit. A delay in the

development of the simulator made this difficult. The sampling issues led to a small sample size, and therefore difficulties obtaining statistically significant findings due to lack of adequate variance. Future research should therefore also ensure they have a larger sample than we obtained.

An additional limitation is non-randomized assignment to the groups, as mentioned in the methodology chapter. The non-randomization, in addition to the small sample size, may have limited our ability to control for other possible interferences or variables that may explain the relationships as a result of the manipulation. For future research, it is possible to execute a successful quasi-experimental study without randomization, if the sample size is larger (Shadish, Cook & Campbell, 2002). Nevertheless, it would be interesting to see if randomization of participants into the two groups would change future results in an investigation of the same relationships as in the present study.

The operationalization of the manipulation of the experimental conditions is also a limitation in this study, in that the quality of the many cognitive, behavioral and directing functions that feedback serves, were more jeopardized in the MODF condition compared to the PODF condition, as it was delayed. Due to the specific design of the simulator and practical possibilities, this was the modification that came closest to the theoretical prerequisites of mastery-feedback. This, however, may have unintentionally reduced the quality of the feedback functions in MODF, as PODF was more interactive and contained more game elements. Future research interested in perceptions of digital performance, -versus mastery feedback through experimental designs, could ensure manipulating the feedback so that both are delivered more equally in terms of timing to exclude any other variance that could alter the feedback perceptions. It could also be interesting to add an additional control group to the design that does not receive any feedback on their performance. This would illuminate whether no-feedback in simulation training leads to any changes between and across groups in regard to fairness and relevance perceptions, and whether this is influenced by degree of individual self-efficacy. This might add new insight into the existing simulator feedback literature and address the potential gap on how these different feedback types delivered in simulation training might impact perceptions of fairness and relevance.

6 CONCLUSION

In conclusion, this thesis has sought to examine how performance- and mastery oriented digital feedback may influence perceptions of feedback fairness and relevance, while inspecting the possible moderating effect of individual self-efficacy. We postulated 7 hypotheses based on established theory and research that sought to answer our research question: "*How may performance and mastery orientated digital feedback relate to the perceived relevance and fairness of feedback received in simulation training?"*

We conducted a quasi-experimental posttest design with two treatments, adapted by Shadish, Cook & Campbell (2002) suitable for our purpose, with n=53 participants that was non-randomized into two conditions. One group receiving instant performance oriented digital feedback, and the other receiving delayed mastery orientated digital feedback, with a following posttest questionnaire measuring feedback fairness, and relevance perceptions, and degree of perceived individual self-efficacy, with the control variables age and gender. The results from our analysis yielded non-significant support for our 7 hypotheses, only partially supporting hypothesis 5, as self-efficacy was found to be directly related to increased perceptions of feedback relevance. Our dataset did however display some interesting patterns. Those receiving PODF generally had higher feedback ratings than those receiving MODF, but not at a statistically significant level. Efficacious individuals saw the feedback as more relevant in both groups, but rated the feedback as having low fairness when receiving MODF, but not at a statistically significant level. We believe that the non-significant findings are in part because of the lack of an adequately sized sample, the lack of non-randomized groups and the operationalization of the manipulated feedback conditions, such that PODF was instant and MODF was delayed.

Due to the lack of significant findings in our study, we cannot make any causal inferences about how performance and mastery oriented digital feedback may relate to perceptions of fairness and relevance of feedback. Even though self-efficacy did relate significantly to relevance perceptions, we cannot say whether it strengthens the relationship between feedback type and perceptions of the feedback either. Based on our discussion it seems that PODF may relate to these feedback perceptions through being perceived as fairer, and more relevant than MODF.

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APPENDIX A: Measurement scales

Fairness perceptions:

1. How fair or unfair are the procedures used to evaluate your performance?
2. How fair or unfair are the procedures used to communicate performance feedback?

Relevance perceptions:

1. It is clear to me how the content of the feedback is related to things I already know
2. The scoring system provided in the feedback conveys the impression that the score is worth knowing.
3. The feedback will be useful to me
4. The feedback is relevant to me
5. The simulator provides me with insights that will be relevant to perform my work tasks

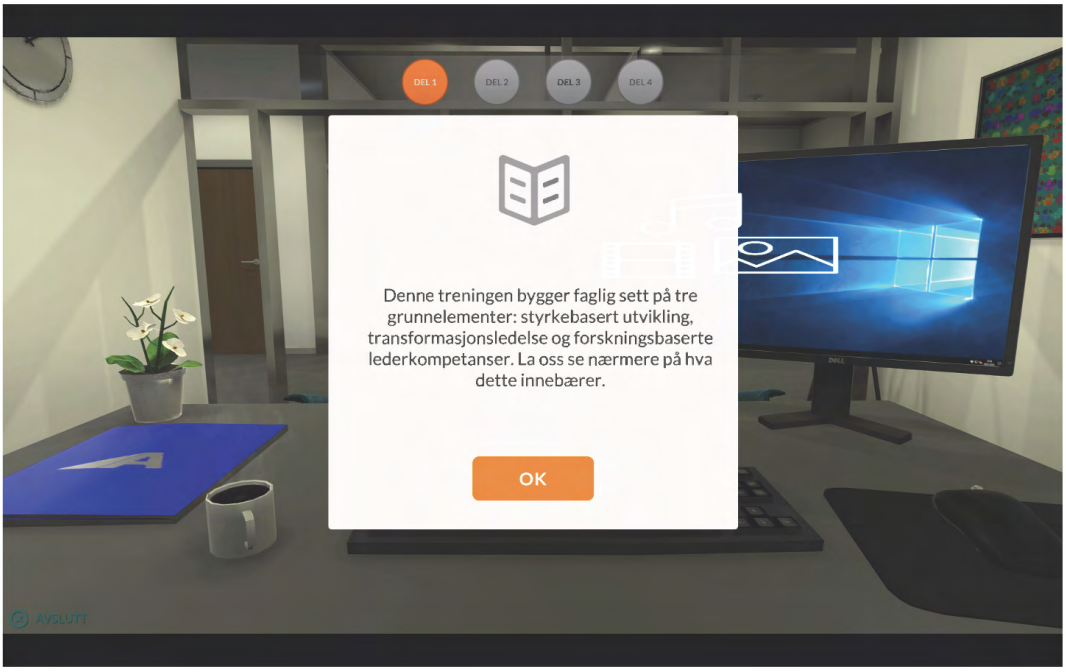
Self-efficacy:

1. I can always manage to solve difficult problems if I try hard enough.
2. If someone opposes me, I can find the means and ways to get what I want.
3. I am confident that I could deal efficiently with unexpected events.
4. Thanks to my resourcefulness, I know how to handle unforeseen situations.

APPENDIX B: Case description

Picture 1: Case description in simulator

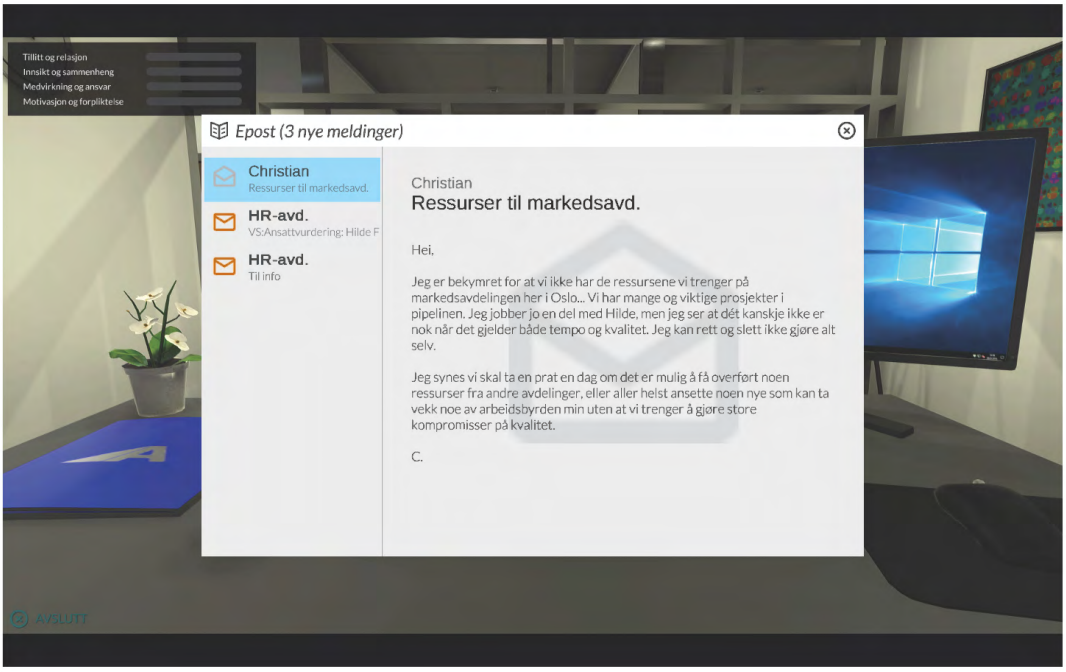
APPENDIX C: Theoretical introduction



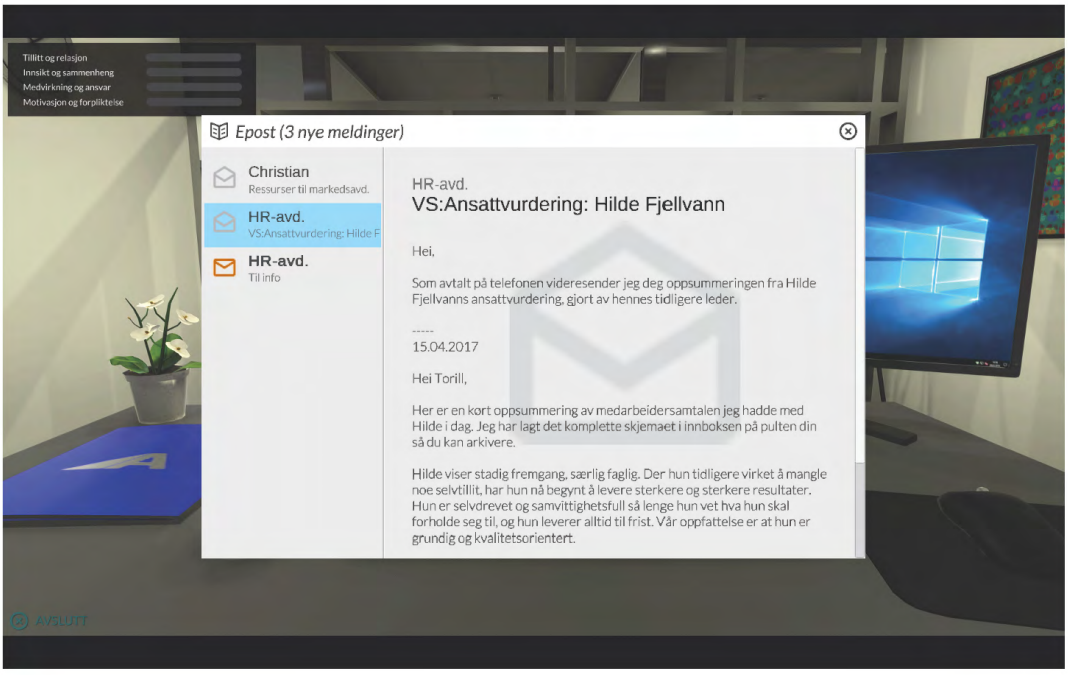
Picture 2: Part 1-Introduction of simulator framework

Picture 3: Illustration of the conversation phases in the theoretical introduction

APPENDIX D: Preparations for conversation

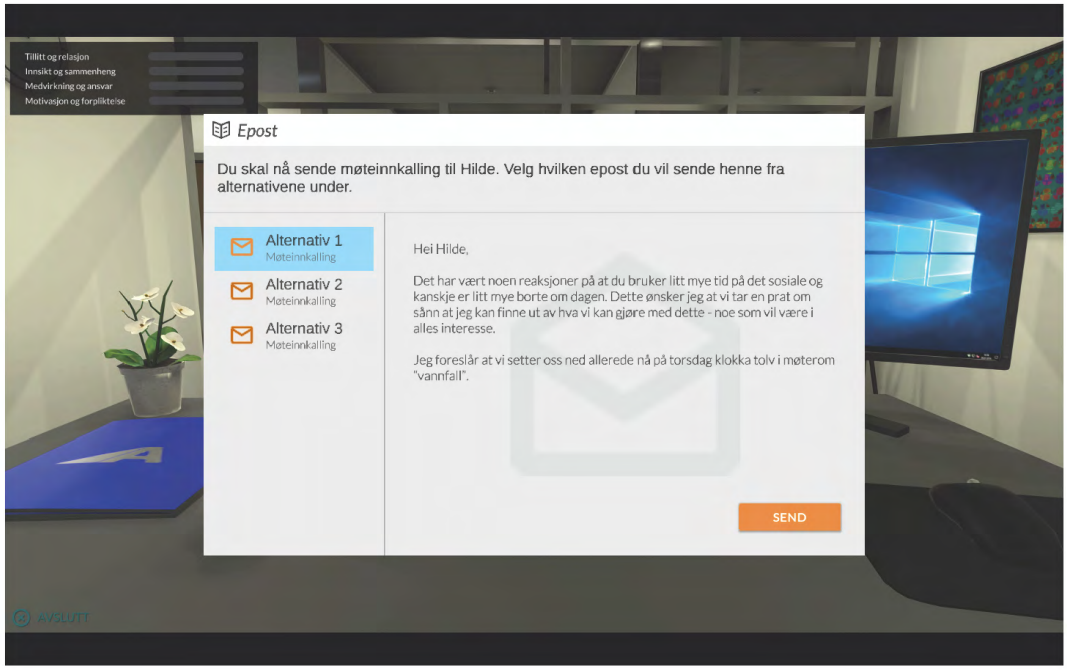


Picture 4: E-mail from closest manager



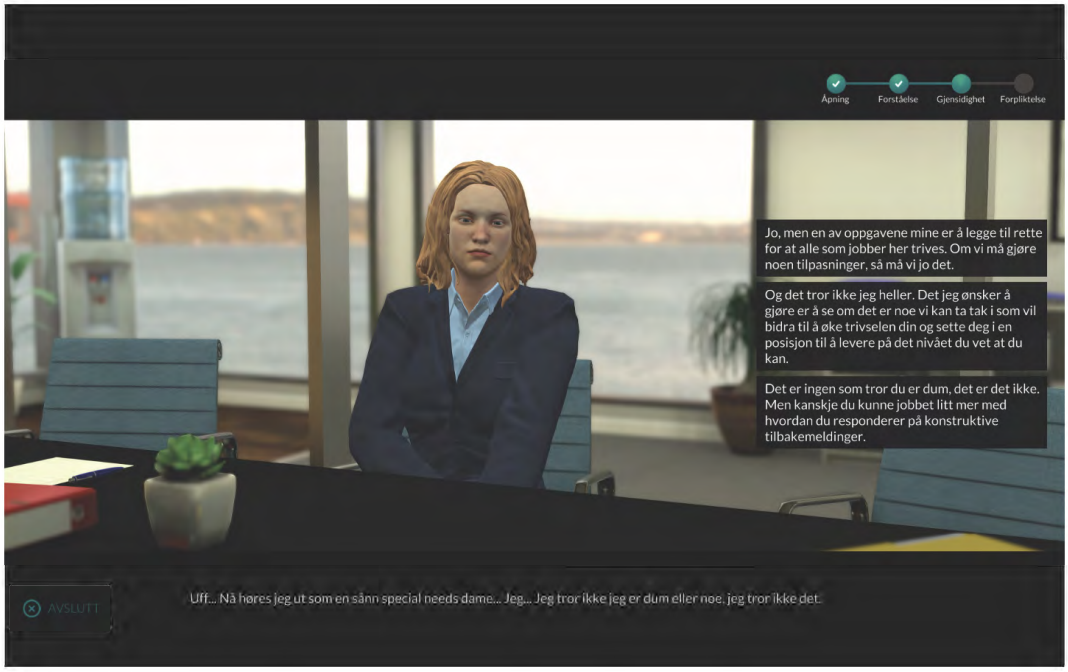
Picture 5: E-mail of the employment evaluation of Hilde

Picture 6: E-mail complaint from HR-department



Picture 7: Example of an alternative invitation to the conversation.

APPENDIX E: Dialogue options in simulator



Picture 8: Dialogue options when in conversation with Hilde

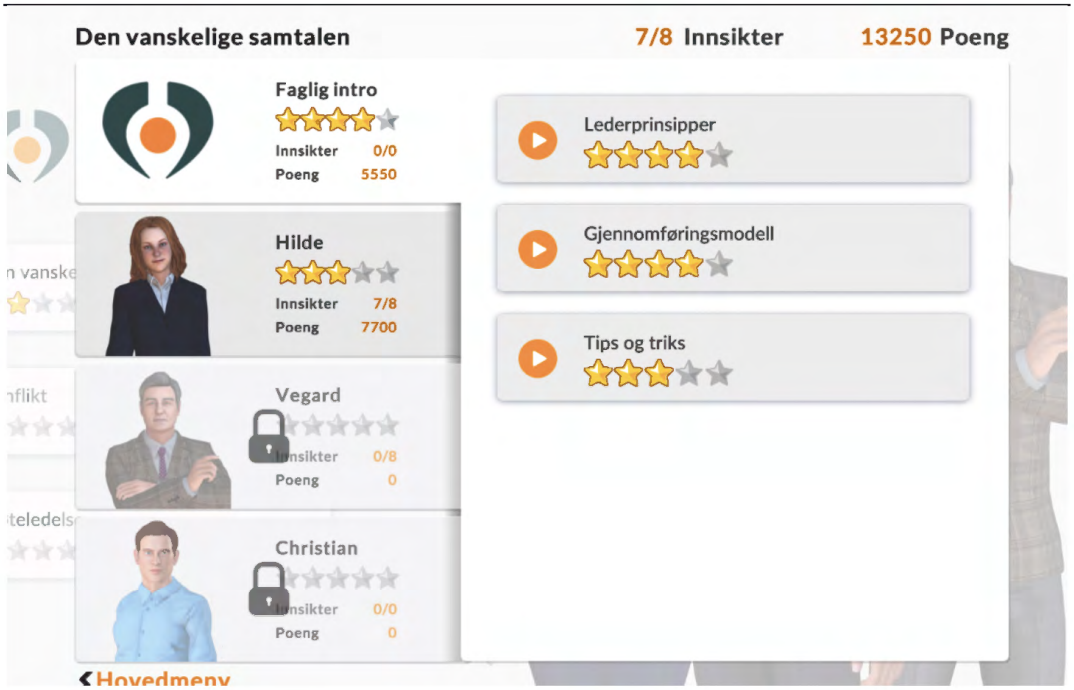
APPENDIX F: Performance oriented digital feedback (PODF)

Picture 9: Feedback circles given after completion

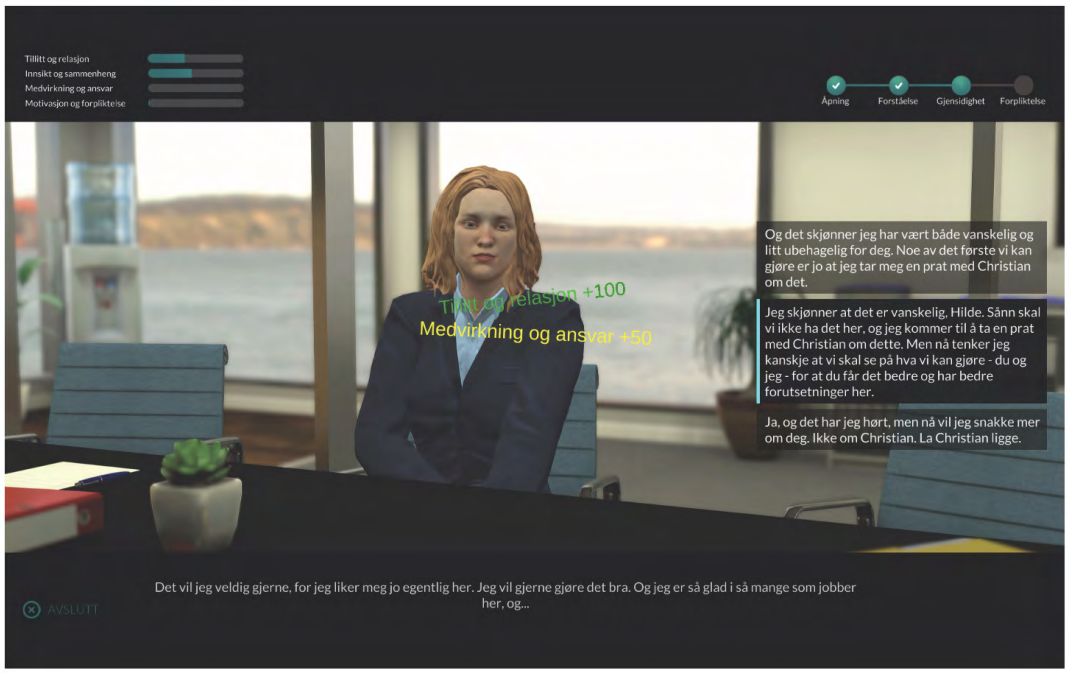
Picture 10:Total battle score given after completion

Picture 11: Barometer given after completion

Picture 12: Barometer given during game



Picture 13: Star scoring



Picture 14: Performance tags

APPENDIX G: Mastery oriented digital feedback (MODF)

Feedback fase 1: Åpning av samtalen
Bra, her har du en fin åpning!

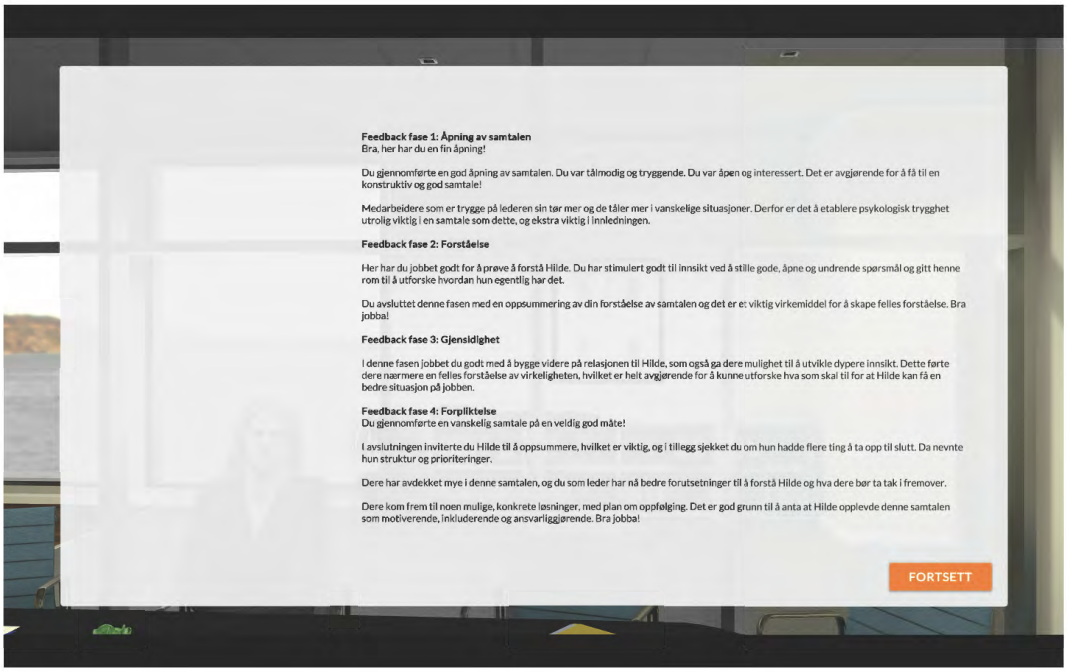
Du gjennomførte en god åpning av samtalen. Du var tålmodig og tryggende. Du var åpen og interessert. Det er avgjørende for å få til en konstruktiv og god samtale!

Medarbeidere som er trygge på lederen sin tør mer og de tåler mer i vanskelige situasjoner. Derfor er det å etablere psykologisk trygghet utrolig viktig i en samtale som dette, og ekstra viktig i innledningen.

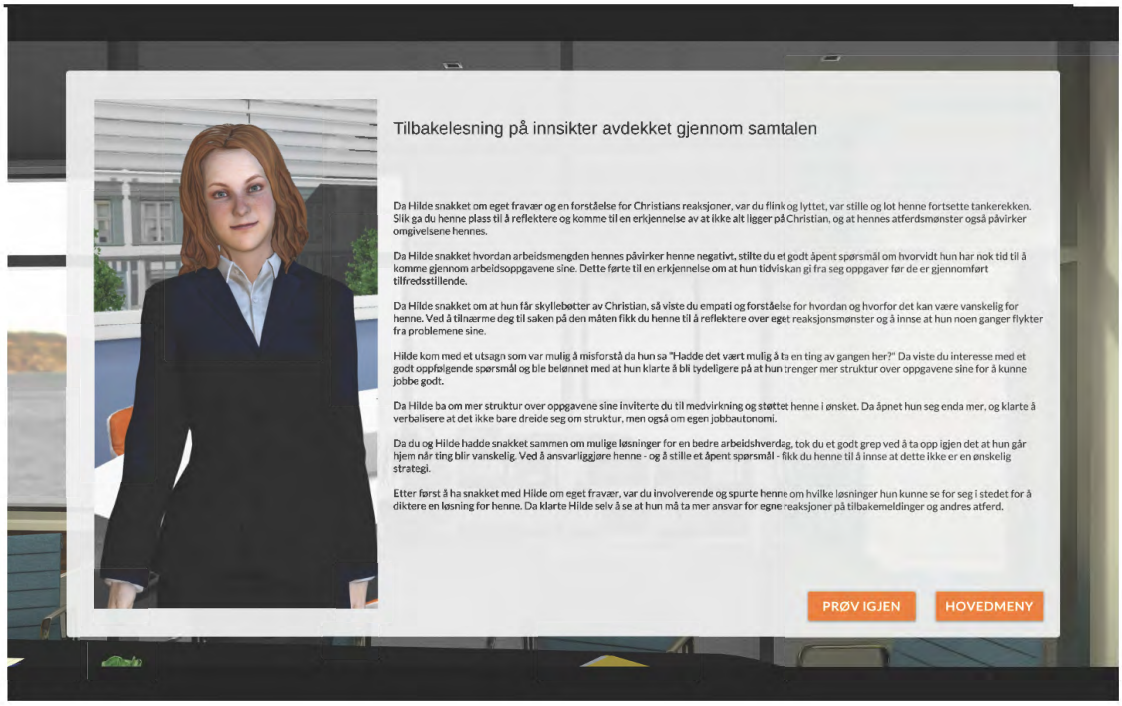
Feedback fase 2: Forståelse
Her fikk du feil fokus i samtalen.

Det å stille seg såpass negativ til bruken av hjemmekontor gjorde at Hilde ble utrygg på hvor hun har deg. I tillegg var det lukkende for samtalen generelt å henge seg opp i en såpass liten detalj før du har fått bedre forståelse for situasjonen til Hilde.

Picture 15: Descriptive feedback when hard fail



Picture 16: Mastery oriented digital feedback after completion 1



Picture 17: Mastery oriented digital feedback after completion 2

APPENDIX H: Simulator information

Assessit

Leadership Simulator

Et innovativt digitalt verktøy som møter morgendagens ledertreningsbehov

HOLD DEG ORIENTERT HER

Assessit er et ledende Skandinavisk HR-selskap med kontorer i Oslo, Bergen, Trondheim og Stavanger, samt Stockholm, København og Århus. Vi jobber med organisasjons - og lederutvikling, executive search, rekruttering og står bak konseptet Årets Unge Ledere.
www.assessit.no

«Når du vil – hvor du vil..»

LEDERSIMULATOR

Et innovativt og digitalt verktøy som møter morgendagens ledertreningsbehov.

Simulatoren skal bidra til mer effektiv ledelse ved å trene i virkelighetsnære og spesifikke situasjoner.

Vi har god erfaring med å utvikle ledernes ferdigheter ved å bruke av skreddersydde digitale treningsverktøy.

LEDERSIMULATOREN GIR:

- Digital spillbasert trening og læring i spesifikke ledersituasjoner.
- Opplevelsesbasert, morsom og innovativ læring, skaper motivasjon og entusiasme + og kontroll over egen læringssituasjon.
- Kosteffektiv og behovsrettet trening, når du vil/ hvor du vil.
- Mulighet for gruppeoppgaver som bidrar til fellesrefleksjon.

VÅR METODIKK

Våre metodikk baseres på tre grunnleggende elementer for å utvikle ønsket lederatferd:

- Øke selvinnsikt.
- Bygge kunnskap.
- Trene ferdigheter.

BRUKSOMRÅDER FOR SIMULATOREN

- Tilpasset virksomhetens behov for fokus og trening.
- Som en integrert del av prosessen for lederutvikling.
- Som forberedelse til viktige ledergjerninger.
- Som grunnlag for vurdering av ferdigheter.

LISENSER OG BRUKERE

Betinger tilgang til brukerplattform. Brukerne laster ned tilgang på PC/Mac.....klar til å starte simulering.

ASSESSITS DIGITAL

Våre digitale løsninger kjennetegnes ved sin fokus på: **Kundeopplevelse, nytte og innovativitet**

De har:

- Solid og relevant faglig innehold, gjerne basert på forskning.
- Spill basert oppbygging.
- Enkel innstallering, uavhengig av PC/Mac.
- Mulighet for skreddersøm og tilpasning til ulike virksomheters behov.

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APPENDIX I: Principal component analysis with equamax rotation

Table 8:

Principal component analysis with equamax rotation

Items:	Relevance	Fairness	Self-efficacy
F1: Hvor rettferdig eller urettferdig er prosedyrene som er brukt til å evaluere din prestasjon?	,169	,938	-,051
F2: Hvor rettferdig eller urettferdig er prosedyrene brukt for å kommunisere tilbakemeldingsskårene på din prestasjon?	,176	,925	,012
R1: Det er klart for meg hvordan innholdet i tilbakemeldingen er relatert til ting jeg allerede vet	,715	,125	-,038
R2: Skåringssystemet som rangerte min prestasjon formidler et inntrykk av at skårene er verdifull	,694	,275	,269
R3: Tilbakemeldingen vil være nyttig for meg	,751	,158	,365

R4: Tilbakemeldingen er relevant for meg	,850	,139	,283
R5: Simulatoren i sin helhet gir meg innsikt som er relevant til utøvelse av mine arbeidsoppgaver	,568	,381	,185
S-e1: Jeg klarer alltid å løse vanskelige problemer hvis jeg prøver hardt nok.	,210	,017	,639
S-e2: Jeg er trygg på at jeg kan håndtere uforventede hendelser på en effektiv måte.	,097	-,105	,785
S-e3: Takket være at jeg er ressurssterk, vet jeg at jeg klarer å håndtere uforutsette situasjoner.	,118	,111	,811

Notes: Extraction method: Principal Component Analysis
Rotation method: Equamax rotation with Kaizer Normalization