

**Fake It Until You Make It: A Study About the Self-Efficacy of Professionals Undergoing
Virtual Conversation Simulations**

Faculty of Social and Behavioral Sciences

Master's thesis Social, Health and Organizational Psychology

Author: Sofia Barroca Henriques Sales (8151199)

First assessor: Dr. Wieby Altink-van den Berg

Second assessor: Dr. Toon Taris

June 24, 2022

Manuscript can be made publicly accessible

Abstract

Supporting the education of communication skills can benefit professionals from all fields. Virtual conversation simulation (CS) allows professionals to learn through interactions with virtual intelligent agents (VIA). Previous studies suggesting self-efficacy (SE) to promote performance guide this study's focus on the SE of professionals (older than 18 years old, from all fields, nationalities and work experiences) who undergo CS training. Scientific findings and components of the Social Cognitive Theory (SCT) and the Trait Activation Theory (TAT) were the basis for the selection of variables possibly involved in the development of SE and for elaborating a conceptual model. The model involved a positive relationship between mindfulness and SE, with curiosity and specific-task performance (STP) as (partial and serial) mediators. A cross-sectional design with an online survey was implemented; quantitative analysis was conducted considering data of 88 participants who undertook a coaching skills simulation and a survey assessing their curiosity, mindfulness and SE. From a total of nine hypotheses, the results suggest support for one of them, showing a statistically significant positive relationship between STP and SE (at a 5% significance level). Thereby, the findings demonstrate initial evidence that CS might have the potential to improve professionals' SE. However, the findings do not suggest that mindfulness and curiosity are positively related to SE (statistically non-significant relationships were found). Studying these variables in the context of virtual CS training is a novel aspect of this study.

Keywords: mindfulness, curiosity, self-efficacy, communication, conversation simulations, intelligent virtual actors.

Introduction

Effective communication is essential for organizations (e.g., Gardner et al., 2001) and nearly all professionals. Numerous university and vocational programs and occupational training aim at developing communication skills (Lala et al., 2017). These are best learned via experiential learning; (Van Merriënboer & Kirschner, 2017) through practice. Often, role-plays are implemented but those might be impractical and inefficient. For instance, frequent sessions to recapitulate learned contents may be difficult to plan (Wang et al., 2008). Thus, there is room for further advancing the communication education field and digital solutions might be promising (Lala et al., 2017). Generally, learning through interactions with Intelligent Virtual Actors (IVA) has led to comparable results to other methods (similar learning outcomes) in the healthcare sector and significantly more efficacy (amount of knowledge gained) than no intervention (Cook et al., 2010).

Scientific knowledge regarding virtual communication training might be key to advancing educational tools and, ultimately, contribute to the facilitation of effective communication in society. Stemming from this purpose, the present study aims to contribute to gathering insights about learning via virtual conversation simulations (CS). More specifically, factors that may be related to learners' self-efficacy (SE) will be examined. Particularly, the role of curiosity, mindfulness and specific-task performance (STP) will be analyzed.

SE refers to self-beliefs about one's capacity to succeed on a certain task (Bandura, 1994) and it is hereby considered beneficial for learners as it was found to be related to higher performance, perseverance, endeavor, and commitment (Pintrich, 2003). For instance, academic self-efficacy has consistently been found to present a statistically significant effect on students' motivation, learning and academic performance (Sadi & Uyar, 2013; Ferla et al., 2009; Putwain et al., 2013). Also, learners with low self-efficacy present a higher likelihood to avoid, postpone and give up on their tasks. On the other hand, those with high self-efficacy tend to be more independent when finding solutions to complex issues, being more patient, persisting longer and making more effort (Sadi & Uyar, 2013; Bandura, 1997). Therefore, inquiry around this factor might ultimately support the development of digital training that fosters players' SE, thereby, possibly achieving more optimal educational outcomes.

To further examine factors that might improve SE, possible relationships between curiosity, mindfulness and specific-task performance (TSP) will be analyzed, concerning self-

efficacy. Curiosity consists of an approach-oriented motivational state, which involves recognizing, pursuing, and wishing to explore events considered challenging, novel and uncertain (Kashdan & Silvia, 2009). Along with that, mindfulness refers to focusing attention on the present moment (Kabat-Zinn, 1994), towards external and internal (or intrapsychic) stimuli (Leroy et al., 2013; Dane, 2011), while being accepting and non-judgmental (Kabat-Zinn, 1994). Therefore, both elements could possibly be connected (e.g. mindfulness could refer to awareness of stimuli and curiosity to stimuli exploration). Additionally, both are found to be related to learning as, for example, mindfulness seems to contribute to attention, problem-solving, working memory and cognitive flexibility (Levy et al., 2001; Ostafin & Kassman, 2012) and curiosity appears to support gathering knowledge and building competencies (Kashdan & Silvia, 2009). Thereby, both constructs could be involved in learning through CS. If considering TSP as the performance in the virtual, the three variables (curiosity, mindfulness and TSP) might be related amongst themselves.

Examining possible relationships between these variables might contribute to their further conceptualization and understanding of the mechanisms related to self-efficacy, as well as adding to the body of knowledge concerning virtual CS training. Also, the present study might contribute to exploring the usefulness of the Trait-Activation Theory (TAT; Tett & Burnett, 2003) Social-Cognitive Theory (SCT; Bandura, 1986) and the social cognitive perspective of self-efficacy and learning concerning the research question at hand.

Thereupon, the present study aims to answer the following inquiries: to what extent undergoing conversation simulation training is positively related to self-efficacy for professionals? To what extent do mindfulness, curiosity and specific-task performance promote professionals' self-efficacy regarding their communication skills?

Theoretical Framework

The present study investigates the psychology of individual learning, potentially supporting future virtual training design. Thereby, the possible relationship between learners' SE and future performance (even though not hereby directly examined) is a general frame that guides the current inquiry. The formulation of hypotheses is based on different theories and research findings, as no overarching theory or model contemplates the research question at hand.

Subsequently, the digital learning solutions and the definitions of relevant variables will be described. Then, possible connections amongst them will be highlighted based on relevant scientific literature.

Defining relevant factors

Specific-task performance

Interpersonal communication skills (e.g.; questioning, explaining, humor, listening, self-disclosure; Hargie, 1997) are usually best learned via experiential learning; learning within settings that resemble the context in which the learned content is applied. That, along with receiving feedback, shapes the optimal strategy for learning complex behavioral skills, such as communication (van der Vleuten et al., 2019). The present investigation studies the utilization of a virtual CS. It consists of a serious game, which allows users to match their learning with entertainment (Zyda, 2005) by interacting with IVA; digital characters that express natural human modalities, such as facial expressions, gestures, and speech (Beskow et al., 2017). Moreover, the simulation counts with typical real-world situations represented by scenarios, including a setting (location) and the development of dialogues through interactions between the learners and IVAs. After the conversation practice, the learning environment evaluates the students' performance (Lala et al., 2017). The results individuals obtain in this training represent their STP, demonstrating their performance in this learning task. It refers to the percentage of optimal choices that the learner has chosen throughout the simulation while receiving feedback after every choice.

Self-efficacy

Learning will be analyzed through the prism of the social-cognitive theory. This framework emphasizes that individuals learn through interacting with their environment and observing others (Bandura, 1986) and that choices about whether to pursue goals are conditional on people's perceptions of their values, interests and capabilities (Pajares, 2008). Amongst these self-beliefs, SE is a central one. It refers to individuals' beliefs about their capacity to achieve certain levels of performance on determined tasks (Bandura, 1994). Thus, SE for CS users would refer to the extent to which they believe they are able to learn the skills being taught or perform such a conversation successfully.

Mindfulness

Mindfulness is focusing attention on the present moment while being nonjudgmental and accepting (Kabat-Zinn, 1994). Social and cognitive psychology research often conceptualizes mindfulness as a present-focused state of consciousness (e.g., Brown & Ryan 2003). While acting mindful, an individual's attention may target external stimuli, as well as internal (or intrapsychic) ones (e.g., emotions and intuitions; Leroy et al., 2013). Such states allow individuals to be aware and accepting of changes in experiences and present more flexibility in cognition. Moreover, there are suggestions of individual differences in propensity to experience this state, as well as the possibility for one to increase theirs (Yeganeh, 2007). Thereupon, simulation players' mindfulness could concern their present-centered attention during the CS. For instance, the degree to which they may be aware of the stimuli from the game, make conscious choices and accept difficulty.

Curiosity

Curiosity is an approach-oriented motivational state defined by acknowledging, pursuing and desiring to explore events that are novel, uncertain and challenging (Kashdan & Silvia, 2009). Curiosity refers to multiple related components, such as seeking exploration, stress tolerance while facing novelty (Kashdan et al., 2018) and searching to diminish knowledge gaps (Litman, 2005). For instance, it has been indicated to lead people to ask questions (Peters, 1978), read deeply (Schiefele, 1999) and persevere on challenging projects (Sansone & Smith, 2000). It has been suggested to facilitate individuals' exploration, learning and immersion in events. Ultimately, it appears to serve to build knowledge and competencies and motivate individuals to behave and think in new ways (Kashdan & Silvia, 2009). Thereby, simulation players' curiosity could possibly facilitate their exploration of the content of simulations, being more immersed in the training and approaching novel information, for instance.

Openness to experience (McCrae, 1996) and sensation-seeking (Zuckerman, 1994) are examples of higher-order traits associated with curiosity. Lower-order comprehensions might explain variance not contemplated by higher-order concepts, thus, the present study investigates curiosity per se, as a lower-order construct, as that represents better what is being studied and includes a focus on state curiosity, since the curiosity presented within the timeframe of the participation in the study is the target construct. This study's understanding of state and trait curiosity is aligned with TAT, considering the interactions between both components, depending

on individual differences and situational factors (Tett et al., 2013). It is understood trait curiosity is expressed through the intensity and frequency of state curiosity (Silvia, 2008).

Expected relationships between the variables

STP and SE

Social-cognitive theory (SCT) highlights different sources of SE. Amongst them, the most powerful predictor is previous personal experiences of success. Generally, SE might be reinforced by successes and weakened by failures (Cook & Artino, 2016). This could be the basis for expecting that CS players' SE might be related to STP.

Hypothesis 1: The higher the professionals' specific-task performance, the higher their self-efficacy.

Mindfulness and STP

Moreover, mindfulness states during conversation simulations might be related to STP. This is supported by findings concerning the relationship between mindfulness and learning since STP concerns performance in a learning task (CS). STP refers to CS' results (the extent to which they choose better response options in total, which might reflect their learning).

Mindfulness has been suggested to support learning in numerous ways. For instance, findings suggest mindfulness might contribute to learning being active and productive, combining mental effort, meta-cognitive and volitional non-automated processes (Bochun, 2011; Salomon & Globerson, 1987). Thereby, it can be hypothesized the connection between mindfulness and learning might also occur for communication skills learning through CS training.

The mechanisms involved in the relationship between mindfulness and learning might be illustrated by the concept of mindful learning. It refers to a flexible state of mind through which individuals are sensitive to their context, aware of new stimuli and actively engaged in the present (Langer, 2000); it has been suggested to support improvement in attention, problem-solving, emotion, cognitive flexibility and working memory (Levy et al., 2001; Ostafin & Kassman, 2012). Mindful learning seems to promote awareness of differing perspectives, openness to new information and novelty (Langer & Moldoveanu, 2000), contributing to enhancing working memory's efficiency and mastery experience (Hassed & Chambers, 2014). Thereupon, simulation players' mindfulness might promote their learnings, or enhance their STP.

Hypothesis 2: The higher the professionals' mindfulness, the higher their STP.

Mindfulness and SE;

SCT considers emotional information as a predictor of SE (Cook & Artino, 2016). Particularly, positive emotions generally increase SE, as opposed to negative emotions (Pajares, 2008; Bandura, 1997). Along with that, mindfulness has been classified as a means for emotional states' improvement (Harris et al., 2016) and suggested to be significant and positively associated with improved emotional well-being (Menges & Caltabiano, 2019), more positive thought patterns and decreased negative affect (Andrews-Hanna et al., 2013). Thus, although the relationship between mindfulness and emotions will not be hereby directly examined, scientific literature might support the hypothesis that mindfulness would be associated with self-efficacy, as emotional states seem to predict self-efficacy (Bandura, 1997).

Additionally, mindfulness may enhance task persistence through higher distress tolerance (Carpenter et al., 2019), it appears to support finding meaning in adversities and positive reappraisal has been found to mediate the relationship between mindfulness and (academic) SE (Hanley et al., 2015). Thereby, in the context of employees learning through a CS, acting mindfully could possibly enhance their perseverance, being less discouraged by eventual distress related to the CS, and promote positive reappraisal that might foster their SE beliefs. Considering TAT's emphasis on the importance of subjective perception of external cues on activated trait-expressive behavior, mindful perceptions of the CS might contribute to activating SE beliefs. Furthermore, it can also be hypothesized that a relationship between mindfulness and SE could be partly explained by STP.

Hypothesis 3: The higher the professionals' mindfulness, the higher their SE.

Hypothesis 4: A positive relationship between mindfulness and SE is partially mediated by STP.

Mindfulness and curiosity

Mindfulness has been suggested to inspire higher sensitivity to one's surroundings, openness towards novel information, perceptions, or concepts, and heightened awareness of different perspectives when problem-solving (Langer & Moldoveanu, 2000; Davenport & Pagnini, 2016). Thus, it can be argued that higher mindfulness of CS players could imply higher awareness of the richness of the virtual environment, new information being offered and the different routes a conversation could take. In this regard, as curiosity involves exploring, learning and immersing oneself in events that are targets of their attention (Kashdan & Silvia, 2009), the

possibly heightened awareness brought by mindfulness might allow individuals to have a higher depth and/or plurality of attended stimuli that might engage their curiosity. Thus, curiosity and mindfulness are expected to be positively associated with each other.

Hypothesis 5: The higher the employees' mindfulness, the higher their curiosity.

Curiosity and self-efficacy

Curiosity could also be related to SE, considering possible conceptual connections between both variables. Particularly, SE has been found to promote learning motivation (Putwain et al., 2013) and curiosity has been vastly investigated as a predictor of learning motivation (Silvia, 2006; Silvia, 2012). An illustration of a possible mechanism to explain their link might lie in the suggestion that, when it comes to knowledge about information, smaller information gaps seem to be related to higher curiosity (Markey & Loewenstein, 2014). Thereby, utilizing TAT's understanding that individuals' perceptions of cues may impact the activation of trait-expressive behavior (Tett et al., 2013), it can be proposed that the extent to which information gaps are perceived with curiosity might influence individuals' SE. For instance, the more professionals undergoing CS are curious, they might perceive information gaps as smaller (considering that curiosity involves wanting to explore challenges and novelty; Kashdan & Silvia, 2009), thereby, their SE beliefs could be enhanced. Additionally, as mindfulness might promote curiosity, which in turn could enhance SE, curiosity might also be a mediator within the relationship between mindfulness and SE.

Hypothesis 6: The higher the professionals' curiosity, the higher their SE.

Hypothesis 7: A positive relationship between mindfulness and SE is partially mediated by curiosity.

Curiosity and specific-task performance

Moreover, higher learning performance might possibly be explained by the learners' curiosity. As curiosity has been suggested to motivate exploration, learning, contribute to individuals' immersion in interesting events, and fosters the construction of knowledge and competence (Kashdan & Silvia, 2009). For instance, fMRI has shown curiosity levels to be correlated with brain regions related to memory and anticipated rewards and to pupil dilation, which might indicate attention (Kang et al., 2009) and a higher likelihood to spend effort on learning (Litman et al., 2005). Thereby, it can be hypothesized that it could foster the players' performance in the CS training (higher STP), as it might be related to their memory, attention

and applying effort to learn. No studies have explored the relationship between curiosity and performance while learning through CSs.

Hypothesis 8: The higher the employees’ curiosity, the higher their STP.

Considering potential mediators, the present study focuses more on investigating the potential mediator role of curiosity and STP in the relationship between mindfulness and SE, as can be demonstrated by hypotheses 4 and 7. Furthermore, it is also be examined whether these potential mediators could act as serial mediators, by testing the whole elaborated model, which is subsequently described.

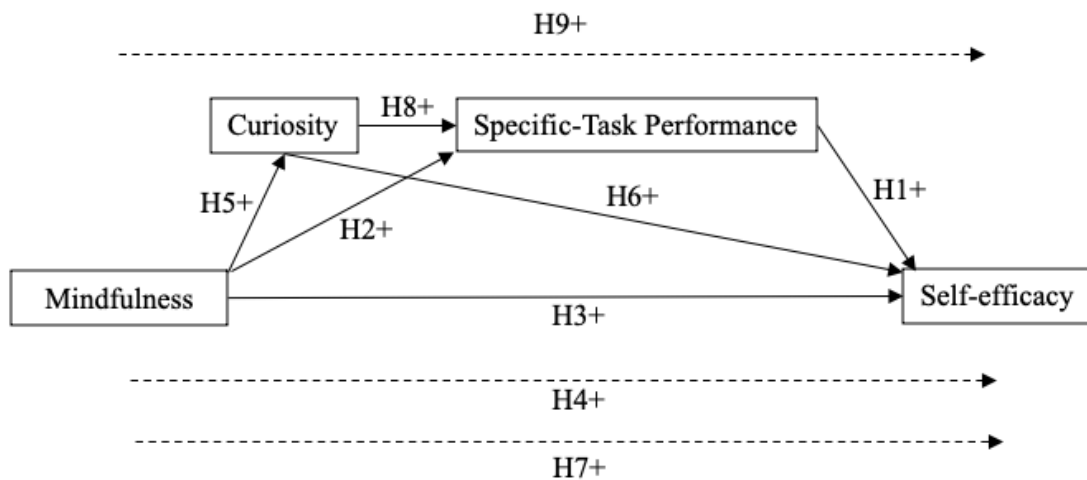
Hypothesis 9: The relationship between mindfulness and SE is serially mediated by curiosity and STP.

Conceptual model

Considering the described theoretical background and research findings, the following model has been constructed and exhibits the hypotheses under investigation.

Figure 1

Conceptual model



Note. + = positive relationship. Direct relationships are indicated by full arrows and partial (or serial) mediations by dotted arrows.

Methods

Design and procedure

The present inquiry consists of quantitative and correlational research that includes hypotheses to be tested. The project was registered via the Utrecht University Student Ethics Review & registration site to receive ethical approval from the Faculty Ethics Review Board.

The participants have received a link to the virtual simulation platform, developed by the Dialogue Trainer company. An information letter, the informed consent (about guidelines, procedures, confidentiality, anonymity and ethical procedures) and brief information about basic coaching communication skills (see appendix 5) were presented. Subsequently, they were directed to the CS, within the DialogueTrainer digital environment. A hypothetical background story was described, encompassing the players' relationship with the IVA's character and the goal of the conversation (see appendix 6). Then, they played the simulation and received their end scores. Posteriorly, they were forwarded to respond to the scales, which were arranged in the Qualtrics environment. The online survey method was chosen as it allows for gathering a large sample size in a relatively cheap, fast and efficient way.

Participants

The target population of this study consists of working adults, older than 18 years old, across all occupational fields and from any nationalities and residence locations. The participants played a conversation simulation and responded to a self-report survey. Data collection lasted three weeks and occurred through convenience sampling, together with the snowballing procedure, as that would facilitate acquiring a sufficient sample size under strict time constraints. The power analysis was conducted via the software G*Power 3.1 (Faul, et al., 2009). It has considered three predictors, a margin of error of 5%, an effect size d of 0.15, alpha of 0.05 and aiming for a power of 0.80, at least 85 participants were expected. Given the lack of studies that resemble the present one, a moderate effect size was selected, searching for a sufficiently powerful design. A higher power was not chosen, as limited resources and time constraints would not allow for collecting a bigger sample size.

There were 100 subjects participating in the study, however, only 88 participants have completed it entirely, so 12 were not considered in the statistical analysis. 39 participants (44.3%) were between 18 to 24 years old, 27 (30.7%) between 25 to 30 years old, 19 (21.6%) between 31 and 50 and 3 participants (3.4%) were older than 51 years old. Five of them (5.7%) have an Asian nationality, 58 (65.9%) European, four (4.5%) North American and 21 (23.9%) from South American. Most of them were highly educated (61.4% completed graduate education and 30.7% undergraduate studies). The occupational fields vary among the sample, but, regarding work experience, only 6.8% present senior levels. Furthermore, most of the sample

present from none to six months of experience conducting difficult professional conversations. For a complete overview of the descriptive statistics, see appendix A.

Measures

The selection of scales is aligned with the definitions of the constructs that were described in the theoretical section and that contemplates the current proposed model. The suitability of the scales regarding the sample has been considered through analysis of the reliability and validity of the scales.

Self-efficacy

As implemented by Leal-Costa (2020), the Specific Self-Efficacy Scale for communication in difficult situations (Doyle et al., 2011), composed of two scales was used. These two questionnaires are the Extent of Difficulty Scale (Arranz et al., 2005) and the Confidence Scale (Parle et al., 1997). Nonetheless, these were adapted to the context of the training used in the present study. Thus, the scale about difficulty assesses players' perceptions of their ability to manage problems during interactions with other professionals in their work environment. Whereas the scale regarding confidence contemplates the players' confidence in themselves to handle what occurs during interactions with other professionals within their work environment.

The main difference between the original scales and the adapted ones is that the latter includes instructions to respond to the questionnaire while considering professional conversations with a colleague or an employee, instead of with patients within a healthcare sector. For instance, the adapted version of the confidence scale item "encourage a patient to talk about emotional concerns", refers to talking to a co-worker or an employee (see appendix B). Additionally, the altered difficulty scale, instead of asking about the difficulty concerning "being able to relieve the patient's suffering", asks about "being able to empathize with their (colleague or employee's) struggles".

Regarding the reliability of these scales, the internal consistency for confidence has been found to be represented by Cronbach's $\alpha=0.88$ and the difficulty by Cronbach's $\alpha=0.90$; (Doyle et al., 2011). Further research might still address the validation of these scales (Parle et al., 1997) and there is a lack of previous findings concerning the validity of both scales. However, in absence of equivalent alternative scales appropriate to this specific context, these were implemented in this study. The alpha coefficient hereby found for the altered confidence scale

was .8 and for the altered extent of difficulty scale .88 (demonstrating high reliability; Almquist et al., 2019). The present inquiry used a combination of them as an overall assessment of SE. The Cronbach's alpha of the combined scales is .85.

Mindfulness

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) was chosen as it assesses state mindfulness, unrelated to meditation practice, and at an individual level (Sutcliffe et al., 2016). It is a self-report measure with five items, responded to through a Linkert scale. It was designed to measure the short-term or current expression of a central component of mindfulness (a receptive state in which sensitive awareness guides attention through simple observation of unfolding events in the present; Brown & Ryan, 2003). An example of an item (which is reversely scored) is "I was doing something automatically without being aware of what I was doing". The distributed scale had minimal adaptations to guarantee that it fits best to the context of the study (to measure self-reported mindfulness with regards to the participants' experience while playing the CS; see appendix C). Previous research on the MAAS has found a Cronbach's alpha of .81 (Brown & Ryan, 2003) indicating high reliability (Almquist et al., 2019). Moreover, it has been demonstrated to be valid, having its convergent and discriminant validity investigated. The scale has been found to converge with well-being scales, but the correlations are low or moderate at best, exhibiting that it assesses a distinct construct. Moreover, its comparative validity was indicated through a correlation with an indirect measure of mindfulness (.7) and demonstrations that both correlate similarly with other scales (e.g.; both MAAS and the indirect measure presented a correlation with a reflection scale of .2; Brown & Ryan, 2003). The present study found a Cronbach's alpha of .77, indicating high reliability (Almquist et al., 2019).

Curiosity

The assessment measure of curiosity is an original adaptation of the C-State form of the Melbourne Curiosity Inventory (MCI; Naylor, 1981). The MCI was developed based on state-trait curiosity research that emphasizes the interactional nature between state and trait curiosity. Particularly, it concerns the notion that C-trait is developed through exposure to stimuli that trigger C-State responses. The situations' quality and the responses from approach responses influence the likelihood of arousal of C-State in a certain situation (Naylor & Gaundry, 1976). The C-State form of the MCI was applied, while the 20 statements, measured through a Likert

scale, were slightly altered to the context of the present study. This way, curiosity is being measured with regard to the participants' experience playing the CS (see appendix D). Thus, it is being assessed the curiosity over the information from the training, the learning goals, the type of conversation that was being taught and the training per se. For instance, the item "I feel curious about what is happening" was altered to "I feel curious about the learning topics from the simulation". Naylor (1981) found an alpha coefficient of .87 regarding the state version of the MCI and reported evidence of discriminant validity in relation to correlations found with subscales of an instrument designed to assess interest categories (Campbell, 1977). Hereby, the reliability of this (slightly adapted) assessment measure appears to be high (Almquist et al., 2019), as the Cronbach's alpha coefficient was of .93.

Specific-task performance

The STP corresponds to the final scores players attain from a CS that teaches basic coaching communication skills. These scores are proportionate to the number of correct answers, instead of wrong or least ideal ones.

The CS starts with a brief explanation of important communication skills when coaching a stressed professional colleague (see appendix E). Then, the scenario instructs the participants to, based on the provided information, play a CS interacting with a character that would be a distressed co-worker (see appendix F). Playing the simulation involved the development of a dialogue of alternating statements from the player and the character. The players choose between (on average) three quotes (one is wrong, one is ideal and the other is moderately wrong) intending to respond to the IVA effectively. At every choice, feedback is shown about the accuracy of the choice. Higher STP is seen as obtaining a higher proportion of correct options.

There are no previous investigations of this simulation's validity and reliability as an assessment measure, nevertheless, the scoring follows the procedure conducted by Hulsbergen et al. (2021). As the STP is obtained through the DialogueTrainer digital environment, scores could be computed according to the players' interactions with the IVA. To compose the best-practice route, the GROW coaching model developed by Alexander & Renshaw (2005) has been considered. This four-step model consists of the phases: goal identification, review of the current reality, conclusion and agreement on the next steps. This model seemed suitable as it can easily be taught and might be a useful and simple tool (Passmore, 2016). Five scores combined assess the STP: "opening", "emotional support", "coaching", "reflective listening" and

“agreement/closing”. Each of them assesses different skills being taught (see appendix G). Each decision item (node) refers to gaining scores on certain parameters, depending on the skills that they correspond to. The STP is the average between these four scores from zero to 100.

Statistical analysis

The statistical analysis was computed via the IBM SPSS 28. The descriptive tool of SPSS was used to analyze the sample. Moreover, exploratory factor analysis was conducted to check to construct validity, concerning homogeneity and multicollinearity. In this respect, it was verified if the KMO is higher than .6 and Bartlett’s tests of sphericity were significant ($p > .5$). Furthermore, scree-plots with Eigen-values higher than one were analyzed, to examine this study’s validity. The scales seemed to be reliable as their Cronbach’s alpha was higher than .7 (Almquist et al., 2019). Moreover, they were considered valid as the average inter-item correlations have not exceeded .7. To facilitate comparison of this study with others and considering the assumptions seem to be sufficiently met (described further subsequently), no items were removed. Furthermore, regression analysis was conducted to investigate hypotheses 1, 2, 3, 5, 6 and 8 and Haye’s PROCESS macro model 6 was used to address the hypotheses 4, 7 and 9. The p-level used to test the hypotheses (test statistical significance) corresponds to $p < .05$ (5% level).

Results

Descriptive statistics and correlations

Table 1 displays the sample size, minimum scores, maximum scores, mean (m) and standard deviation concerning the data collected through the four assessment measures. The minimum score for STP is 3.8, while the maximum is 100, so a wide range of STP was observed. The mean score was 57.16 which is near the actual average in this assessment (50). The mean score for mindfulness seems high and for curiosity and SE the scores are relatively near their average (3). This suggests that this sample demonstrates above-average levels of mindfulness ($m=4.09$) and around average curiosity ($m=2.83$) and SE ($m=3.23$). Furthermore, considering the correlations between the scales (see table 2), only STP and SE present a significant relationship ($r = .29$; $p = .01$). This suggests that those with higher STP also presented higher SE. Furthermore, the other correlations between the scales are not statistically significant.

Table 1.*Descriptive statistics and correlations table.*

	Descriptive Statistics					Bivariate correlations				
	n	Min	Max	M	SD	α	1	2	3	4
1. STP	88	3.8	100	57.16	22.63			.29**	-.15	.13
2. SE	88	2	5	3.23	.61	.75	.29**		.04	.18
3. CR	88	1	4	2.83	.52	.93	-.15	.04		.07
4. MF	88	2	5	4.09	.75	.75	.13	.18	.07	

Note. n = number of respondents, Min= minimum score from the sample, Max= maximum score from the sample, M = Mean, SD = Standard Deviation, α = Cronbach's Alpha.

**Correlation is significant at the .05 level (2-tailed, $p < .05$).

Range of scales: Specific-task performance: 0-100, Self-efficacy: 1-5, Curiosity: 1-4, Mindfulness: 1-5.

STP's α is not included as STP refers to the total scores participants achieved in the simulation.

Gender is not included in the table as it was not a binary variable (women, men and third-gender/binary).

Hypotheses testing

Direct effects hypotheses

Regression analyses have been conducted to examine all the hypotheses, except for the ones that investigate mediations. Concerning hypothesis 1 (the higher the professionals' STP, the higher their SE), the obtained was .85, implying that 8.5% of the variance in SE can be predicted by STP. The ANOVA table suggests a statistically significant relationship between STP and SE and, since $B=.01$, for every one-unit increase in STP, SE increases by .01. Or, for every standard-deviation increase in STP, SE will increase by .29 of the standard deviation. The regression equation for this model is $\hat{y}=2.83+.01x$.

However, the other regression analyses conducted do not present statistically significant relationships. Particularly, when testing hypothesis 2 (the higher the professionals' mindfulness,

the higher their STP) the relationship between mindfulness and STP ($R^2=.00$; $p=.24$) was not found to be statistically significant. Additionally, when testing hypothesis 3 (the higher the professionals' mindfulness, the higher their SE), the relationship between mindfulness and SE ($R^2=.03$, $sig=.10$) was not statistically significant. Also, testing hypothesis 5 (the higher the professionals' mindfulness, the higher their curiosity) led to results that suggest a relationship between mindfulness and curiosity ($R^2 = 00$; $p=.53$) that is not statistically significant. Furthermore, regarding hypothesis 8 (the higher the employees' curiosity, the higher their SE), the relationship between curiosity and SE ($R^2 = .00$; $p=.73$) was not demonstrated to be statistically significant. Thereby, these hypotheses were not supported by the present findings.

Table 2

Linear Regression Analyses Output of Hypotheses 1, 2, 3, 5, 6 and 8

	B	SE	Beta	t	sig. p	R ²
<i>Dependent Variable: SE</i>						
STP	.01	.00	.29	2.83	.01	.09
Mindfulness	.14	.09	.18	1.65	.10	.03
Curiosity	.04	.13	.04	.34	.73	.00
<i>Dependent Variable: STP</i>						
Mindfulness	3.84	3.22	.13	1.19	.24	.01
Curiosity	-6.29	4.61	-.15	-1.36	.18	.02
<i>Dependent variable: Curiosity</i>						
Mindfulness	.05	.08	.07	.63	.53	.00

Note. N = 88, B = Unstandardized coefficient, SE= Standard Error, Beta = Standardized coefficient, R² = R squared

* = relationship is significant at the .05 level

Hypotheses 4, 7 and 9

Haye's PROCESS macro model 6 was utilized to investigate hypotheses 4, 7 and 9, focusing on the possible mediator roles within the relationship between mindfulness and SE. Hypothesis 4 states that a positive relationship between mindfulness and SE is partially mediated by STP and the results do not provide evidence for that ($b = .05$; bootstrap interval = $-.05$ to $.18$). Moreover, hypothesis 7 is that a positive relationship between mindfulness and SE is partially mediated by curiosity. The acquired findings also do not support this hypothesis ($b = .01$; bootstrap interval: $-.03$ to $.06$). Furthermore, hypothesis 9 expects a positive relationship between mindfulness and SE to be serially mediated by curiosity and STP. In this respect, the findings do not support this hypothesis ($b = .00$; bootstrap interval: $-.02$ to $.01$).

Discussion

The present investigation aimed at examining the self-efficacy of employees who undergo a virtual conversation simulation, interacting with an intelligent virtual agent. Generally, the findings might represent initial evidence to suggest that virtual conversation simulations might have the potential to improve professionals' self-efficacy of their capacity to succeed in professional conversations. Additionally, the results do not suggest that mindfulness and curiosity would enhance the self-efficacy of professionals who undergo virtual conversations simulation training. Subsequently, the findings will be further discussed.

Findings' interpretations and theoretical contributions

Virtual conversation simulations and professionals' self-efficacy

The participants' STP was found to have a positive and statistically significant ($p < .05$) relationship with their SE. This evidence supports SCT's consideration of previous performance as a predictor of SE; experiences of success would reinforce SE, while failures reduce it (Cook & Artino, 2016). This may demonstrate that the higher the STP, the more the participants perceived themselves to be able to learn the relevant skills for conducting such a conversation successfully. The R^2 found was $.09$, which suggests a weak relationship (Cohen, J. 1988) and might reveal that other factors also play a role in explaining SE's variance. A weak correlation is not aligned with understanding previous performance as a powerful source of SE, however, indications that other sources are relevant coincide with the SCT as well (Cook & Artino, 2016). Nonetheless, further research might help determine the strength of STP as a predictor, relative to other predictors.

Moreover, TAT can help to comprehend the statistically significant positive relationship ($p > .05$) between STP and SE; situations of achieving more successful results in CS may facilitate

activation of individuals' self-efficacy. Social-cognitive theory can be used to interpret this relationship as well; professionals who undergo CS learn through past performance, in a way that previously scoring high on a CS would reinforce their self-beliefs of being able to succeed in a relevant professional conversation in the future.

The relationship between mindfulness and self-efficacy

Moreover, the relationship between mindfulness and SE was not found to be statistically significant ($p > .05$). In this sense, it is possible to interpret that individuals do not feel more capable to succeed in a professional conversation, in accordance with how mindful they are during the CS training. This contradicts the proposed mechanism that mindfulness would promote SE and previous literature demonstrating a statistically positive relationship between mindfulness and self-efficacy (see Chandna et al., 2022). Additionally, the results indirectly do not provide evidence for mindfulness enhancing SE beliefs through positive reappraisal as a mediator (Hanley et al., 2015).

Furthermore, if assuming mindfulness as an indicator of improved emotional well-being (based on the found positive and statistically significant relationship between mindfulness and emotional well-being; Menges & Caltabiano, 2019), it can be interpreted that the findings do not support SCT's consideration of improved emotional states as a predictor of SE (Bandura, 1997). On the other hand, an alternative interpretation could be that employees' mindfulness while playing CS would not imply more positive emotional states in this case. Nevertheless, at a theoretical level, the results do not endorse comprehending mindfulness as a predictor of SE.

Further findings involving curiosity and specific-task performance

The relationship between mindfulness and curiosity is not statistically significant ($p > .05$). Thereby, the findings are not aligned with the suggested mechanism that proposed mindfulness would enhance curiosity. The proposition was that mindfulness would heighten one's sensitivity to stimuli in the present moment (Langer & Moldoveanu, 2000), increasing the likelihood of one detecting an event of their interest, thereby promoting curiosity. Using TAT to interpret the finding, it could be suggested that the extent to which mindfulness is present in the subjective perception of the CS might not result in differences in activation of curiosity (which, in turn, would be related to increases in STP).

Along with that, the results do not indicate statistical significance ($p > .05$) for the relationships between mindfulness and STP and between curiosity and STP. In this respect, CS

scores were not shown to be higher accordingly to the extent to which participants perceived themselves as mindful or curious. Thereby, the findings do not provide evidence to support indications that mindfulness (e.g.; Bochun, 2011; Ostafin & Kassman, 2012) and curiosity (Kashdan & Silvia, 2009) would promote learning (if assuming that STP would hereby also represent learning, as it concerns the performance of a learning task). Nevertheless, the gathered data concerns only one simulation playthrough, future research assessing a longer-term use of the simulation might be able to draw further conclusions concerning learning.

Furthermore, the relationship between curiosity and SE is not statistically significant ($p > .05$). The findings do not support the hypothesis that the higher the learners' curiosity, the higher their SE. This might indicate that the curiosity of professionals, as possibly triggered by the CS, might not be related to their beliefs about their capacity to conduct relevant conversations. This finding can be interpreted by using TAT's suggestion that subjective perceptions of situational cues might affect the activation of trait-expressive behavior (Tett et al., 2013). In this sense, the extent to which curiosity is present in subjective perceptions of conversation simulations might not result in differences in activation of SE.

Mediator roles and the whole model

By testing the whole conceptual model of this study, the results do not suggest that curiosity and STP are serial mediators in the relationship between mindfulness and SE. This is interpreted from the confidence intervals concerning indirect effect(s) of mindfulness on SE including the value zero. Moreover, when testing partial mediations separately, both curiosity and STP were not found to be partial as well. Therefore, the expectation that mindfulness would enhance SE through curiosity or STP is not supported by the current findings, nor that mindfulness would contribute to SE by promoting curiosity, which, in turn, would heighten STP. Thereupon, no evidence has been found for supporting the model hereby tested, or mediating roles of curiosity and STP in a positive relationship between mindfulness and SE.

Practical relevance

The present investigation contributes to gathering insights concerning the use of IVA for communication training and the experience of employees who undergo CS training for learning professional communication skills. Investigation of this educational method is relevant as it appears to tackle drawbacks of role-plays and offers an effective alternative for communication training (Lala et al., 2017). Scientific evidence that can be applied for CS design supports the

ultimate purpose of facilitating the education of communication skills. The focus on SE is important as this factor seems to be related to future performance (e.g. Bandura, 1997). If CS simulation training supports employees' SE beliefs, they might also foster their actual performance when conducting important professional conversations. Thus, they can be used as interventions or training to improve professionals' SE in the context of relevant communication skills. Moreover, this study also contributes to gathering scientific insights possibly relevant to supporting the development of CS design that more optimally fosters learners' SE.

The statistically significant positive relationship between STP and SE ($p < .05$) might indicate that conversation simulations could be used as a tool for fostering professionals' SE about their ability to conduct professional conversations. Considering SE's contribution to future performance, a heightened SE could also mean that CS can help employees not only feel more secure about their communication skills but also undertake more successful conversations. The relevance for that lies in the importance of communication in society. As an illustration, the studied sample has learned coaching communication skills. Higher performance in applying coaching communication skills in the workplace could, for instance, contribute to an amicable organizational culture and exchanging of insights amongst members. Generally, if applying CS improves performance in professional conversations, it could carry benefits across all occupational fields (Lala et al., 2017) and organizations, given that 50 to 80% of employees' work time is spent communicating (Giri & Kumar, 2010) and communication might be the primary means for coordinating individual activities, facilitating processes of devising, disseminating and seeking organizational goals (Gardner et al., 2001).

Furthermore, dominant response tendencies related to confronting challenges and novelty generally involve anxiety and curiosity. However, the literature on anxiety is abundant, as opposed to studies on the curiosity which have been rather neglected. The present study might reveal the necessity for further research to support the production of knowledge around this topic. Curiosity is an important topic to better comprehend how individuals thrive (Kashdan & Silvia, 2009) and it was hereby explored in a novel context.

Investigating mindfulness may ultimately support the field of development of occupational and educational mindfulness-based interventions. This is particularly interesting as mindfulness interventions require minimal resource investment (Messer et al., 2016). More specifically, the gathered results do not support the use of mindfulness-based interventions to

(via enhancing mindfulness) improve self-efficacy (e.g. Katan et al., 2019). However, it also does not represent evidence of mindfulness-based interventions reducing self-efficacy (Firth et al., 2019). Nevertheless, these indications might also possibly be influenced by the setup of the study. As an example, the online survey could perhaps be related to participants being more relaxed. Also, the sample was not necessarily going to experience the situation they would need to apply the learned skills. Accordingly, the present study contains limitations that weaken possible conclusions from its results. These will be discussed thereafter.

Limitations

The convenience sampling and snowballing methods, together with the higher number of participants who are between 18 to 30 years old and have entry-level work experience could impair the generalizability of the results, as the target population is working professionals of all experience levels. Further research could gather a more representative sample.

Moreover, the limited resources and time constraints for this study did not allow for investigating the long-term use of the CS training. The participants only played the simulation once, which might be a threat to the external validity of the findings. Thus, future research conducted through longitudinal design might be able to investigate an experience more similar to the actual training, as professionals who undergo virtual CS training are allowed to repeat the playthroughs. Additionally, a longitudinal design might allow for assessing SE concerning changes in STP over time, which may be a relevant phenomenon to be addressed by future research.

Furthermore, the present study has not considered that the experience of the participants could have been affected by them being first-time users of the DialogueTrainer virtual platform. When it comes to learning via virtual reality, there are indications of a familiarization process for new users; they might take a certain time to feel comfortable with novel digital environments, and this process' duration and complexity might vary according to the learning tasks' objectives, format and the users' aptitude (Nikolic et al., 2019). Thus, it could be possible that the participants' mindfulness, curiosity, specific-task performance and self-efficacy could have been affected by them still getting acquainted with the learning platform. Possibly, future research might address this issue by providing a familiarization task before the CS, or asking participants about their experiences after it.

Conclusion

This investigation aimed at answering the research questions: to what extent undergoing conversation simulation training is positively related to self-efficacy for professionals? To what extent do mindfulness, curiosity and specific-task performance promote professionals' self-efficacy regarding their communication skills? The results indicate a positive and statistically significant relationship ($p < .05$) between specific-task performance and self-efficacy, possibly demonstrating initial evidence for utilizing virtual conversation simulations as a tool for increasing professionals' self-efficacy and performance in work conversations. Considering the relevance of efficient communication in society, the findings contribute to a line of research of great importance. Additionally, the statistically significant relationship ($p < .05$) between specific-task performance and self-efficacy supports a component of the social cognitive theory (previous performance as a predictor of self-efficacy). Moreover, curiosity and specific-task performance were not found to be (partial or serial) mediators in a relationship between mindfulness and self-efficacy. This finding supports further delineation of theoretical models that strive to comprehend mechanisms of the development of self-efficacy. The present inquiry contains limitations that could be further addressed by future research. Mainly, the sample might carry biases, most of the participants were until 30 years old, had entry-level work experiences and were from Europe. Further research with a more representative sample would have a higher external validity, in terms of the generalizability of the results to the target population (all nationalities, ages [above 18 years old] and work experience). Moreover, longitudinal designs could study changes in self-efficacy over time, as well as investigate the longer-term use of the conversation simulations. This would support achieving more external validity and increasing the generalizability of the results, as professionals undertaking conversation simulation training are allowed to practice repeatedly and on different days. This study might support applied research concerning CS development, for example by indicating that this type of training might be able to increase the self-efficacy of the trainees and, more specifically, that the professionals' specific-task performance in the simulations might be a predictor of their self-efficacy. Thus, results might indicate that simulation design that supports specific-task performance might benefit simulation players' self-efficacy. Future research could continue to explore SE's underlying mechanisms for ultimately optimizing virtual communication training and facilitating efficient communication amongst professionals.

References

- Alexander, G., & Renshaw, B. (2005). *Super Coaching*. Random House Business.
- Almquist, Y. B., Kwart, S., & Brännström, L. (2019). A practical guide to quantitative methods with SPSS(Version 2). Research Reports in Public Health Sciences.
<https://doi.org/10.17045/sthlmuni.10321829.v2>
- Andrews-Hanna, J. R., Kaiser, R. H., Turner, A. E. J., Reineberg, A. E., Godinez, D., Dimidjian, S., & Banich, M. T. (2013). A penny for your thoughts: Dimensions of self-generated thought content and relationships with individual differences in emotional wellbeing. *Frontiers in Psychology, 4*, Article 900. <https://doi.org/10.3389/fpsyg.2013.00900>
- Arranz P., Ulla S. M., Ramos J. L., Del Rincón C., López-Fando T. (2005). Evaluation of a counseling training program for nursing staff. *Patient Educ. Counsel. 56*(2), 233–239.
<https://doi.org/10.1016/j.pec.2004.02.017>
- Bandura A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs.
- Bandura A. (1994). *Self-efficacy*. In: Ramachaudran (Ed.), *Encyclopedia of Human Behavior, 4*, 71-81. Academic Press.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Times Books.
- Beskow, J., Peters, C., Castellano, G., O'Sullivan, C., Leite, I., & Kopp, S. (2017). *Intelligent virtual agents. 17th international conference. proceedings*. Springer Verlag.
- Bochun, P. (2011). *Mindfulness and Creativity*. Canadian Teacher Magazine.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology, 84*(4), 822–848.
<https://doi.org/10.1037/0022-3514.84.4.822>
- Campbell, D. P. (1977), *Manual for the SVIB-SCII* (2nd ed.). Stanford University Press.
- Carpenter, J. K., Sanford, J., & Hofmann, S. G. (2019). The Effect of a Brief Mindfulness Training on Distress Tolerance and Stress Reactivity. *Behavior therapy, 50*(3), 630–645.
<https://doi.org/10.1016/j.beth.2018.10.003>
- Chandna, S., Sharma, P. & Moosath, H. (2022). The Mindful Self: Exploring Mindfulness in Relation with Self-esteem and Self-efficacy in Indian Population. *Psychol Stud 67*, 261–272. <https://doi.org/10.1007/s12646-021-00636-5>

- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge.
- Cook, D. A., & Artino, A. R., J. (2016). Motivation to learn: an overview of contemporary theories. *Medical education*, 50(10), 997–1014. <https://doi.org/10.1111/medu.13074>
- Cook, D. A., Erwin, P. J., & Triola, M. M. (2010). Computerized virtual patients in health professions education: a systematic review and meta-analysis. *Academic medicine: journal of the Association of American Medical Colleges*, 85(10), 1589–1602. <https://doi.org/10.1097/ACM.0b013e3181edfe13>
- Dane, E. (2011). Paying attention to mindfulness and its effects on task performance in the workplace. *Journal of Management*, 37(4), 997–1018. <https://doi.org/10.1177/0149206310367948>
- Davenport, C., & Pagnini, F. (2016). Mindful learning: a case study of Langerian mindfulness in schools. *Front. Psychol.* 7(1): 1372. <http://dx.doi.org/10.3389/fpsyg.2016.01372>
- Doyle D., Copeland H. L., Bush D., Stein L., Thompson S. (2011). A course for nurses to handle difficult communication situations. A randomized controlled trial of impact on self-efficacy and performance. *Patient Educ. Counsel.* 82(1), 100–109. <https://doi.org/10.1016/j.pec.2010.02.013>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Ferla, J., Valcke, M., & Cai, Y. (2009). Academic self-efficacy and academic self-concept: Reconsidering structural relationships. *Learning and individual differences*, 19(4), 499–505. <https://doi.org/10.1016/j.lindif.2009.05.004>
- Firth, A. M., Cavallini, I., Sütterlin, S., & Lugo, R. G. (2019). Mindfulness and self-efficacy in pain perception, stress and academic performance. The influence of mindfulness on cognitive processes. *Psychology Research and Behavior Management*, 12, 565. <https://doi.org/10.2147/PRBM.S206666>
- Gardner, J., Paulsen, N., Gallois, C., Callan, V., & Monaghan, P. (2001). An intergroup perspective on communication in organisations. In H. Giles & W. P. Robinson (Eds.), *The new handbook of language and social psychology* (pp. 561–584). Wiley.

- Giri, V. N., & Kumar, B. P. (2010). Assessing the impact of organizational communication on job satisfaction and job performance. *Psychological Studies, 55*(2), 137–143. <https://doi.org/10.1007/s12646-010-0013-6>
- Hanley, A. W., Palejwala, M. H., Hanley, R. T., Canto, A. I., & Garland, E. L. (2015). A failure in mind: Dispositional mindfulness and positive reappraisal as predictors of academic self-efficacy following failure. *Personality and Individual Differences, 86*, 332–337. <https://doi.org/10.1016/j.paid.2015.06.033>
- Hargie, O. (1997). *Handbook of communication skills*. Routledge.
- Harris, A. R., Jennings, P. A., Katz, D. A., Abenavoli, R. M., & Greenberg, M. T. (2016). Promoting stress management and wellbeing in educators: Feasibility and efficacy of a school-based yoga and mindfulness intervention. *Mindfulness, 7*(1), 143–154. <https://doi.org/10.1007/s12671-015-0451-2>
- Hassed, C., & Chambers, R. (2014). *Mindful Learning: Reduce stress and improve brain performance for effective learning* (3rd ed.). Exisle Publishing.
- Hulsbergen, M.H., de Jong, J. & van der Smagt, M.J. (2021). *Exploring the use of online simulations in teaching dialogue skills*. [Manuscript submitted for publication]. Utrecht University.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. Hyperion.
- Kang, M. J., Hsu, M., Krajbich, I. M., Loewenstein, G., McClure, S. M., Wang, J. T., & Camerer, C. F. (2009). The wick in the candle of learning: epistemic curiosity activates reward circuitry and enhances memory. *Psychological science, 20*(8), 963–973. <https://doi.org/10.1111/j.1467-9280.2009.02402.x>
- Kashdan, T. B., & Silvia, P. J. (2009). Curiosity and Interest: The Benefits of Thriving on Novelty and Challenge. In S. J. Lopez & C. R. Snyder (Eds.), *The Oxford Handbook of Positive Psychology* (pp. 366–374) <https://doi.org/10.1093/OXFORDHB/9780195187243.013.0034>
- Kashdan, T. B., Stikma, M. C., Disabato, D. J., McKnight, P. E., Bekier, J., Kaji, J., & Lazarus, R. (2018). The Five-Dimensional Curiosity Scale: Capturing the bandwidth of curiosity and identifying four unique subgroups of curious people. *Journal of Research in Personality, 73*, 130–149. <https://doi.org/10.1016/j.jrp.2017.11.011>

- Katan, N., Tzafrir, S., & Guy, E. (2019). Effect of mindfulness practice on self-efficacy among employees in an organization. *Academy of Management Proceedings*, 2019(1), 13544. <https://doi.org/10.5465/ambpp.2019.13544abstract>
- Lala, R., Jeurig, J., van Dortmont, J. *et al.* (2017). Scenarios in virtual learning environments for one-to-one communication skills training. *Int J Educ Technol High Educ* 14, 17. <https://doi.org/10.1186/s41239-017-0054-1>
- Langer, E. J. (2000). Mindful learning. *Current directions in psychological science*, 9(6), 220-223. <https://doi.org/10.1111/1467-8721.00099>
- Langer, E. J., & Moldoveanu, M. (2000). The construct of mindfulness. *Journal of Social Issues*, 56(1), 1–9. <https://doi.org/10.1111/0022-4537.00148>
- Leal-Costa, C., Tirado González, S., Ramos-Morcillo, A. J., Ruzafa-Martínez, M., Díaz Agea, J. L., & van-der Hofstadt Román, C. J. (2020). Communication Skills and Professional Practice: Does It Increase Self-Efficacy in Nurses?. *Frontiers in psychology*, 11, 1169. <https://doi.org/10.3389/fpsyg.2020.01169>
- Leroy, H., Anseel, F., Dimitrova, N. G., & Sels, L. (2013). Mindfulness, authentic functioning, and work engagement: A growth modeling approach. *Journal of Vocational Behavior*, 82(3), 238–247. <https://doi.org/10.1016/j.jvb.2013.01.012>
- Levy, B. R., Jennings, P., & Langer, E. J. (2001). Improving attention in old age. *Journal of Adult Development*, 8(3), 189-192. <https://doi.org/10.1023/A:1009546408665>
- Litman, J. A. (2005). Curiosity and the pleasures of learning: Wanting and liking new information. *Cognition and Emotion*, 19(6), 793–814. <https://doi.org/10.1080/02699930541000101>
- Markey, A., & Loewenstein, G. (2014). Curiosity. In A. Einstein, (Ed.), *International Handbook of Emotions in Education* (pp. 228-245). Carnegie Mellon University.
- McCrae, R. R. (1996). Social consequences of experiential openness. *Psychological Bulletin*, 120(3), 323–337. <https://doi.org/10.1037/0033-2909.120.3.323>
- Menges, J. R. & Caltabiano, M. L. (2019). The Effect Of Mindfulness on Academic Self-Efficacy: A Randomised Controlled Trial. *International Journal of Education, Psychology and Counseling*, 4(31), 170-186. <https://doi.org/10.35631/IJEPC.4310015>
- Naylor, F. D. (1981). A State-Trait Curiosity Inventory. *Australian Psychologist*, 16(2), 172–183. <https://doi.org/10.1080/00050068108255893>

- Naylor, F. D., & Gaudry, E. (1976). *A state-trait model of curiosity*. [Unpublished manuscript]. University of Melbourne.
- Nikolic, D., Maftai, L., & Whyte, J. (2019) Becoming familiar: how infrastructure engineers begin to use collaborative virtual reality in their interdisciplinary practice. *Journal of Information Technology in Construction*, 24, 489-508.
<https://doi.org/10.36680/j.itcon.2019.026>
- Ostafin B. D., Kassman K. T. (2012). Stepping out of history: mindfulness improves insight problem solving. *Consciousness and cognition*, 21(2), 1031–1036.
<https://doi.org/10.1016/j.concog.2012.02.014>
- Pajares, F. (2008). Motivational role of self-efficacy beliefs in self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 111–139). Lawrence Erlbaum Associates Publishers.
- Parle M., Maguire P., Heaven C. (1997). The development of a training model to improve health professionals' skills, self-efficacy and outcome expectancies when communicating with cancer patients. *Soc. Sci. Med.*, 44(2), 231–240. [https://doi.org/10.1016/s0277-9536\(96\)00148-7](https://doi.org/10.1016/s0277-9536(96)00148-7)
- Passmore, J. (2015). *Excellence in coaching: The industry guide*. Kogan Page Publishers.
- Peters, R. A. (1978). Effects of anxiety, curiosity, and perceived instructor threat on student verbal behavior in the college classroom. *Journal of Educational Psychology*, 70(3), 388–395. <https://doi.org/10.1037/0022-0663.70.3.388>
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *J Educ Psychol.*, 95(4), 667–686. <https://doi.org/10.1037/0022-0663.95.4.667>
- Putwain D, Sander P, Larkin D. (2013). Academic self-efficacy in study-related skills and behaviours: relations with learning-related emotions and academic success. *Br J Educ Psychol.* 83(4), 633–50. <https://doi.org/10.1111/j.2044-8279.2012.02084.x>
- Sadi O, Uyar M. (2013). The Relationship Between Self-Efficacy, Self-Regulated Learning Strategies And Achievement: A Path Model. *J Baltic Sci Educ.* 12(1), 21–33.
<https://doi.org/10.1016/j.sbspro.2013.09.291>

- Salomon, G., & T. Globerson (1987). Skill May Not Be Enough: The Role of Mindfulness in Learning and Transfer. *International Journal of Educational Research*, 11(6), 623–637. [https://doi.org/10.1016/0883-0355\(87\)90006-1](https://doi.org/10.1016/0883-0355(87)90006-1).
- Sansone, C., & Smith, J. L. (2000). Interest and self-regulation: The relation between having to and wanting to. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 341–372). Academic Press. <https://doi.org/10.1016/B978-012619070-0/50034-9>
- Schiefele, U. (1999). Interest and learning from text. *Scientific Studies of Reading*, 3(3), 257–279. https://doi.org/10.1207/s1532799xssr0303_4
- Silvia, P. J. (2006). *Exploring the psychology of interest*. Oxford university Press.
- Silvia, P. J. (2008). Appraisal components and emotion traits: Examining the appraisal basis of trait curiosity. *Cognition and Emotion*, 22(1), 94–113. <https://doi.org/10.1080/02699930701298481>
- Silvia, P. J. (2012). Curiosity and motivation. In R. M. Ryan (Ed.), *The Oxford handbook of human motivation* (pp. 157–166). Oxford University Press.
- Sutcliffe, K. M., Vogus, T. J., & Dane, E. (2016). Mindfulness in organizations: A cross-level review. *Annual Review of Organizational Psychology and Organizational Behavior*, 3, 55–81. <https://doi.org/10.1146/annurev-orgpsych-041015-062531>
- Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied Psychology*, 88(3), 500–517. <https://doi.org/10.1037/0021-9010.88.3.500>
- Tett, R. P., Simonet, D. V., Walser, B. & Brown, C. (2013). Trait Activation Theory: Applications, Developments, and Implications for Person–Workplace Fit. In N. Christiansen, & R. P. Tett. (Eds.), *Handbook of Personality at Work* (pp. 71-100). Routledge.
- van der Vleuten, C., van den Eertwegh, V., & Giroldi, E. (2019). Assessment of communication skills. *Patient Education and Counseling*, 102(11), 2110-2113. <https://doi.org/10.1016/j.pec.2019.07.007>
- Van Merriënboer, J. J., & Kirschner, P. A. (2017). *Ten steps to complex learning: A systematic approach to four-component instructional design*. Routledge.

- Wang, S., O'Brien-Pallas, L. L., & Hayes, L. (2008). *A review and evaluation of workplace violence prevention programs in the health sector*. Nursing Health Services Research Unit Toronto.
- Yeganeh, B. (2007). *Mindful experiential learning* (Doctoral dissertation, Case Western Reserve University).
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge University Press.
- Zyda, M. (2005). From visual simulation to virtual reality to games. *Computer*, 38(9), 25-32.
<https://doi.org/10.1109/MC.2005.297>

Appendix A
Descriptive statistics

Table A1*Descriptive statistics of the participants in the sample*

Categories	Subcategories	N	%
Age	18-24	39	44.3
	25-30	27	30.3
	31-50	19	21.6
	51>	3	3.4
Gender	Men	34	38.6
	Women	52	59.1
	Non-binary/third gender	2	2.3
Nationality	Asia	5	5.7
	Europe	58	65.9
	North America	4	4.5
	South America	21	23.9
Education	Secondary school	7	8.0
	Undergraduate	27	30.7
	Graduate	54	61.4
Occupation	Humanities	18	20.5
	Social and behavioral sciences	29	33
	Geosciences	2	2.3
	Medicine	9	10.2
	Science	9	10.2
	Arts	11	12.5
	Technical/Practical	10	11.4
Work experience	Entry-level	46	52.3
	Intermediate	18	20.5
	Mid-level	18	20.5
	Senior or executive	6	6.8

Note. N= 88.

Appendix B.

Self-efficacy assessment

The original items of the confidence scale (Parle et al., 1997) refer mostly to how confident the respondent would feel to perform certain tasks during a conversation in the health sector, with patients. The present study's adaptation involved a description that the conversation refers to colleagues or employees (before the scale is presented): "If you would now have a professional conversation with a colleague or an employee, how confident would you be to..." Moreover, instead of referring to "patients" (in two items), the administered version referred to "colleague or employee". Additionally, instead of inquiring about depression and anxiety in one of the items, the altered version enquired about stress, as this appeared more relevant to the context of professional conversations. This way, the items after the mentioned instruction were:

1. Initiate a discussion about their concerns.
2. Encourage them to talk about emotional concerns.
3. Explore their intense feelings (such as anger).
4. Conclude the conversation with an agreed problem list and a plan of action.
5. Assess their symptoms of stress.
6. Break bad news to them.
7. Appropriately challenge them if they deny their weaknesses.
8. Help them to deal with uncertainty.

Moreover, the original Extent of Difficulty scale (Arranz et al., 2005) was adapted to the context of professionals in general, instead of communication with patients, their family members and health professionals. It was added an introduction: "If you would now have a difficult professional conversation with a colleague or an employee, how much difficulty would you experience...". The items "Being able to relieve the family members' worries or concerns" and "answering family questions about the patients' illness" (Arranz et al., 2005) were removed. Instead of "Answering the patient's questions about their illness" (Arranz et al., 2005), the altered version had "answering their questions". Instead of "being able to relieve the family members' worries or concerns" (Arranz et al., 2005), it was asked "Being able to empathize with their concerns". Instead of the two items "communicating with physicians" and "communicating with nurses", it was used "communicating with team members".

Appendix C

Mindfulness assessment

The version utilized in the present study instructed participants as follows: “Using the 0-6 scale shown, please indicate to what degree were you having each experience described below while you were playing the simulation. Please answer according to what really reflected your experience rather than what you think your experience should have been.” This is different from the MAAS (Brown & Ryan, 2003), as, instead of “while you were playing the simulation”, the MAAS states “when you were paged” (Brown & Ryan, 2003). Instead of “I was doing something without paying attention”, “I was doing something automatically, without being aware of what I was doing” and “I was rushing through something without being really attentive to it.” (Brown & Ryan, 2003), the altered version stated “I was playing without paying attention”, “I was playing automatically, without being aware of what I was doing” and “I was rushing through the simulation without being really attentive to it”. Thus, the items were as follows:

1. I was finding it difficult to stay focused on what was happening.
2. I was playing without paying attention.
3. I was preoccupied with the future or the past.
4. I was playing automatically, without being aware of what I was doing.
5. I was rushing through the simulation without being really attentive to it.

Appendix D

Curiosity Assessment

The original MCI was slightly altered so the questionnaire is about curiosity concerning the experience playing the simulation, the learning topics covered and the type of conversation approached during the training. The instruction was adapted by telling participants to indicate how they feel regarding the conversation simulation (“Indicate how you feel, right now, with regard to the conversation simulation you have just played.”). The items from the MCI were slightly altered except for the items 1, 3, 8, 10, 17, 19 and 20, which remained entirely the same as from Naylor, (1981). The administered scale was:

1. I want to know more
2. I feel curious about the learning topics from the simulation
3. I am feeling puzzled
4. I want to make sense of my learnings
5. I am intrigued by the learning experience
6. I want to probe deeply into how to approach such conversations
7. I am speculating about what has happened
8. My curiosity is aroused
9. I feel interested in the learning topics from the simulation
10. I feel inquisitive
11. I feel that I have questions about the learning topics from the simulation
12. I wish I could have played more
13. I feel like seeking more knowledge about the learning topics from the simulation
14. I would like to have answers about the learning topics from the simulation
15. I felt absorbed in the learning experience
16. I want to explore possibilities within such a conversation
17. My interest has been captured
18. I feel like continuing the learning
19. I want more information
20. I want to enquire further

Appendix E

Brief communication skills information text offered to participants

The text presented to the participants was as follows:

Information

Use the following information while playing the coaching conversation simulation later.

Information - Coaching in stressful situations

Through coaching, you can guide your employee to their own solution. You can do this by asking questions and naming what you hear and see so that you bring things to their attention and make them discussable.

When coaching, avoid proposing solutions. After all, the problems others face are complex, and providing "simple" solutions rarely really fits. The conversation should focus on the other person's development. Your role is that of a patient, interested, and understanding interlocutor, and you only offer advice if the other person explicitly asks for it.

What do you achieve if you do it right?

By coaching, you achieve a sustainable solution to the problem and you get a stronger team member in return.

4-step model

There are many approaches to coaching. We will here follow a simple four-step model:

1- Opening the conversation

The other indicates having a problem. 'Problem awareness' is important, as the other must be ready to talk and think about it.

2- Clarifying the challenge

Coaching usually focuses on a problem or challenge, where the solution lies in behavior. Clarifying exactly what that challenge is is very important. That's why you mainly ask questions. Emotional reflections also serve to start a conversation about what the other person is thinking, but not yet saying.

3- Exploring Routes

The exploration of solutions should have a focus on the other person and their experiences, perspectives, and their own solutions. Remember: if you solve the problem, your employee will not solve it.

4- What will the other do now?

Making concrete next steps and follow-up conversation is useful. If their commitment seems low, you can start coaching again.”

Appendix F.**Background story at the start of the conversation simulation**

“Imagine that you work at a company and a colleague of yours, Lisa, does not seem to be doing well. She has joined the company a year ago and you have a good working relationship with her. As she adopts more responsibilities, you notice that she lately seems quite stressed. During the past week, she is often irritated, immersed in her work and takes little time for breaks. At the end of a meeting, she remains seated. How can you support her?”

Appendix 7.

Definitions of the parameters

Concerning the parameter “opening”, points are provided when players choose nodes that support the establishment of rapport with the IVA, for example, when it contains open-ended questions. The parameter “emotional support” refers to choosing response options that show empathy and an unbiased view. “Coaching” refers to exploring the interlocutor’s problem through open-ended questions, summaries and affirmations. “Reflective listening” corresponds to using reflections of feelings, meaning, open-ended questions and, along with that, showing attentive listening. The parameter “agreement/closing” refers to rounding off the conversation, clarifying what was discussed, offering help and establishing next steps.

Appendix G.

Factor analysis

Assumptions that hold the factor analysis were checked. The assumption of absence of outliers appears to hold (Cook's distance < 1). The types of variables are acceptable (they are ordinal or ratio). However, the sample size might be too low (as $n=100$ is generally considered a lower limit range) and the sample size is of 88 participants. Additionally, the assumption of linearity might not be fully matched, considering that the correlations from the "correlations" table are lower than .3 (Almquist et al., 2019).

Nonetheless, it was decided to continue with the factor analysis based on further information concerning four assessment measures combined. In their correlation matrix, the values of the correlations between the variables are generally low. However, when considering an alpha of 0.05, there is a significant correlation between STP and SE. Moreover, the Kaiser-Meyer-Olkin (.53) is higher than 0.5 and the Bartlett's test of sphericity shows a p-value smaller than .05 (.03). This indicates the hypothesis that there would be no correlations between the variables can be rejected. These characteristics also indicate that there might be sufficient variance in the data to be partitioned via factor analysis (Almquist et al., 2019). The "total variance explained" table suggests using two factors (one explains 18.63% of the total variance and the other 7.71%).

Table G1

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.529
Bartlett's Test of Sphericity	Approx. Chi-Square	14.065
	df	6
	Sig.	.029

Note. 5% significance level.

Table G2

Communalities

	Initial	Extraction
STP	.115	.388
Mindfulness	.049	.130
SE	.113	.333
Curiosity	.032	.202

Note. Extraction Method: Principal Axis Factoring.

Table G3

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
	1	1.422	35.550	35.550	.745	18.628	18.628
2	1.093	27.334	62.885	.308	7.711	26.338	.358
3	.820	20.512	83.396				
4	.664	16.604	100.000				

Note. Extraction Method: Principal Axis Factoring.

Factor Analysis: Self-efficacy

Table G4

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.800
Bartlett's Test of Sphericity	Approx. Chi-Square	603.699
	df	105
	Sig.	<.001

Note. 5% significance level.

Table G5*Total Variance Explained*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
	1	4.891	32.608	32.608	4.520	30.136	30.136
2	2.734	18.224	50.831	2.337	15.578	45.714	2.820
3	1.307	8.713	59.544	.960	6.401	52.115	2.514
4	1.034	6.893	66.437	.565	3.766	55.881	1.899
5	.866	5.773	72.210				
6	.742	4.945	77.154				
7	.714	4.758	81.912				
8	.541	3.605	85.517				
9	.479	3.196	88.714				
10	.447	2.978	91.691				
11	.376	2.508	94.199				
12	.320	2.135	96.335				
13	.232	1.546	97.881				
14	.216	1.443	99.323				
15	.102	.677	100.000				

Note. Factor loadings < .03 are suppressed. Extraction Method: Principal Axis Factoring.

Factor Analysis: Mindfulness

Table G6*KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.760
Bartlett's Test of Sphericity	Approx. Chi-Square	129.946
	df	10
	Sig.	<.001

Note. 5% significance level.

Table G7*Total Variance Explained*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.709	54.183	54.183	2.237	44.733	44.733
2	.763	15.267	69.450			
3	.724	14.486	83.935			
4	.535	10.705	94.640			
5	.268	5.360	100.000			

Note. Factor loadings < .03 are suppressed. Extraction Method: Principal Axis Factoring.

Factor Analysis: Curiosity**Table G8***KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.901
Bartlett's Test of Sphericity	Approx. Chi-Square	1043.278
	df	190
	Sig.	<.001

Note. 5% significance level.

Table G9*Total Variance Explained*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.235	46.176	46.176	8.849	44.243	44.243	8.232
2	1.403	7.015	53.191	.913	4.567	48.811	2.998
3	1.251	6.257	59.448	.907	4.533	53.344	2.810
4	1.096	5.482	64.929	.538	2.691	56.035	4.023
5	.915	4.574	69.503				
6	.849	4.244	73.747				
7	.778	3.891	77.639				
8	.611	3.054	80.693				
9	.589	2.944	83.637				
10	.515	2.575	86.212				
11	.477	2.386	88.598				
12	.401	2.003	90.601				
13	.353	1.763	92.364				
14	.296	1.479	93.843				
15	.283	1.414	95.257				
16	.249	1.247	96.504				
17	.223	1.117	97.621				
18	.212	1.059	98.680				
19	.180	.902	99.581				
20	.084	.419	100.000				

Note. Factor loadings < .03 are suppressed. Extraction Method: Principal Axis Factoring.