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Master thesis

Students' acceptance of the VR environment for practicing public speaking skills

FACULTY OF BEHAVIOURAL, MANAGEMENT, AND SOCIAL SCIENCES MASTER EDUCATIONAL SCIENCE AND TECHNOLOGY

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Foreword

If three years ago someone told me that I will be doing my master in the Netherlands, I would not believe. Nevertheless, it is real. Going back to study after working years was a challenging and exciting experience. Writing my master thesis in the language different from my mother tongue was not an easy task. However, I have to admit that the decision to study at the University of Twente was the best decision I have ever made. I am very grateful to people who made my journey not only possible but also exiting.

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I also want to thank my dear family and friends for their support. My parents fully believed in me, and it gave me the energy to study and do my best. My special thank I want to address to Jeroen, who was there not only to support me but also to give me useful advises and inspire me. I would like to thank Anne Marie and Leo, who became a real family for me. I am grateful to my friends back in Russia and here in Enschede for their help when I needed it and their support. It was a great journey, and now it is time to start the next one.

Abstract

Public speaking skills are important skills for university students. However, practising these skills can be associated with fear and time issues. Thus, the VR training for practising oral presentations can be a solution, where students can practise in a safe environment. The implementation of any new technology depends on users' acceptance of the technology. There is a wide range of research aimed to understand technology acceptance. Nevertheless, only a few of them conducted in the educational context. Moreover, none of the studies included the actual progress in improving skills as a possible determinant of behavioural intention. This study aimed to investigate the relations between progress and technology acceptance using the UTAUT model, as well as the relations between constructs within this model and moderation effect of gender and progress on these relations. The results of the study showed significant positive progress in improving oral presentations and its significant association with the behavioural intention. Progress also correlated significantly with effort expectancy. However, progress did not moderate any studied relations. Effort expectancy was only one construct that correlated significantly with behavioural intention. The effect of performance expectancy was moderated by gender, but the effect of effort expectancy was not.

Keywords: Unified Theory of Acceptance and Use of Technology (UTAUT), technology acceptance, virtual reality (VR), public speaking skills.

Introduction

Good public speaking skills (PSS) are one of the most important skills for young people in the 21st century. The ability to present information in front of a group of people is included in communication skills within 21st-century skills (Ananiadou & Claro, 2009). To be able to speak in public is essential for students in the study context, for example, to conduct presentations for groupmates and professors, like a part of an assessment (Tsang, 2017), to participate in team meetings and take part in the discussions. Moreover, PSS are crucial for a future job, for instance, for an interview, team projects and meetings (Tsang, 2017). Most students find oral presentations one of the most frightening and challenging tasks to be performed and assessed on as part of their academic trajectory (Alwi & Sidhu, 2013). Also, people without experience presenting in public, particularly non-English native speakers, are known to struggle with oral presentations, especially in an academic or professional context (Hincks & Edlund, 2009). Živković (2014) argues that for successful oral communication students should be equipped with comprehensive instructions. They should have opportunities to practice, and the best way to do this is to give oral presentations. Therefore, more attention on developing and improving communication competence in higher education is needed (Alshare & Hindi, 2004). For developing and improving PSS, students should be provided with an opportunity to practice, the environment (space), time and support. The possibility to study can be created in natural contexts (in front of a real audience) and by imagination (imaginary audience). Natural settings can be time- and resources-consuming due to the involvement of other people, especially if a learner needs to present several times. It also can be hard to control the audience and prevent their unconscious reactions. In imaginary settings, some people struggle with imagining things vividly or they try to avoid it due to the fear of presenting in front of public. Imaginary settings were found less effective for coping with fear to present in public (Kothgassner, et al., 2012). Thus, virtual reality (VR) training appears to be an alternative to a natural or imaginary audience, and people can present in front of a virtual audience.

VR technology is a new way of human-computer interactions that allows users to be not only observers but also actors in the virtual environment (Poeschl, 2017). The virtual environment can help to realize and create scenarios that can be hard to realize in real life, for example, giving the speech in front of a large audience. VR training can be controlled and adapted for individual purposes of a learner, for example, one learner can give a speech as many times as needed. Chang, Zhang and Jin (2016) found that VR provides learners with real-time interaction and helps to get experience while practising and the feeling that they are in an environment that feels very close to

reality. Recent studies found that VR applications for practising PSS can be a promising tool for learning purposes. These applications lead to higher performance and they are assumed to lead to better transfer obtained skills to real-life performance (Kothgassner, et al., 2012) in a case when VR closely replicates “real-world environments with stressors, distractors, and complex stimuli” (Neguţ, Matu, Sava, & David, 2016).

Using new technologies, such as VR, can be successful if this technology is accepted by users, otherwise, the performance effect of using the technology will be lost if users reject the technology (Davis, 1993). Users’ acceptance of technology is a crucial determinant of successful implementation and using technology or rejection and failure (Davis, 1993). For predicting users’ behaviour concerning adopting a new technology, it is essential to understand what affects the behaviour. Different tools and models can be used to measure and predict behaviour and find its prerequisites. To understand the students’ acceptance of VR training the Unified Theory of Acceptance and Use of Technology (UTAUT) will be utilised. This tool allows to measure behavioural intention to use a technology, and predict the actual use. This instrument helps to measure and predict users’ behaviour concerning adopting new technologies. This model consists of different determinants or predictors, but also it includes moderators, that affect relations between key constructs and intention to use a technology and actual usage. This model will be discussed in details later, but it is important to note now that the UTAUT helps to understand how adopters perceive the use of the technology and how their perception can predict using of the technology. A users' perception of the technology affects his or her acceptance and future use of this technology (Moore & Benbasat, 1991). Moore and Benbasat (1991) concluded that results of using the technology that are visible and observable for others, is one of the determinants of the technology adoption. They called this determinant as results demonstrability. The results demonstrability in case of practising PSS can be understood as users’ perception that they have improved their oral presentation skills: whether they see the progress in improving PSS using the VR training or not. Therefore, progress in improving PSS may play a role of results demonstrability for understanding users’ acceptance of the technology.

To make the progress of improving PSS visible for learners and help them to improve PSS, formative feedback can be provided. According to De Grez (2009), feedback and assessment are crucial elements in the learning cycle of developing complex behaviour such as PSS. Students who receive frequent feedback can implement the necessary changes (Fluckiger, Tixier y Vigil, Pasco, & Danielson, 2010) and thus improve their oral presentation performance. Several types of feedback can be provided to learners: expert’s feedback, peer-to-peer feedback or self-assessment. Peers’ or

experts' (teachers') feedback requires involving other people in the learning process. Unfortunately, teachers or peers do not always have enough time for analysing students' performance and providing feedback. Self-assessment is a type of feedback that can help learners to assess their current performance and fill the gap between current and desired results (Sadler, 1989; Hattie and Timperley, 2007). Self-assessment is essential for developing and improving PSS (Van Ginkel et al., 2015). Self-assessment can help to measure participants' perception of their results, in other words, to measure their progress. To support self-evaluation, rubrics can be provided to students. It will allow them to judge their progress towards achieving learning goals and standards (De Grez, 2009). Self-evaluation rubrics can help to measure learning results and make the progress more visible for learners.

Therefore, **the goal of this study is threefold.** The first is to create the rubric for self-assessment for training PSS in the virtual environment. The second is to investigate the effect of progress on the acceptance of this VR training in practising PSS. The third is to discover the moderators in predicting intention to use the technology.

Theoretical framework

Last decades education tends to use computers and new technologies increasingly. While classical education took place in classrooms, technologies made a shift from traditional ways of learning to online learning (Gros & García-Peñalvo, 2016). Teaching materials have evolved from printed resources to different kinds of digital resources, such as videos, websites, e-learning courses and others. One of the fundamental parts of learning is interactivity (Noesgaard & Ørngreen, 2015) that can be a reason for the increasing popularity of using Virtual Reality (VR) technologies in education. The VR technology is a new form of media that can help to realize concepts that hard to realize in real life, conduct virtual experiments, provide skill training sessions (Chang et al., 2016). The successful implementation of the VR depends on different factors, and one of these factors is users' acceptance of the technology.

Technology acceptance and the UTAUT model

The positive effect of implementing any new technology can be lost if users will not accept the technology (Davis, 1993). Users' acceptance of a new system predetermines the users' behaviour with regard to using this system (Davis, 1993). There is a wide range of tools for predicting and analysing users' behaviour when implementing a new technology. To understand the students' acceptance of VR training, the Unified Theory of Acceptance and Use of Technology (UTAUT) will be used in this study. The goal of the UTAUT is to help to explain and predict users' intention to use a new technology and further behaviour of usage. Basically, this model helps to understand how people perceive a new technology, how it connects with intention to use the technology and how it can help to predict using of the technology. The UTAUT model invented by Venkatesh et al. (2003) is a result of a compilation of eight different models including the Theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behaviour, Combined Theory of Acceptance Model and Theory of Planned Behaviour, Model of PC utilization, Innovation Diffusion Theory, and Social Cognitive Theory. These models and theories are based on various social and behavioural theories that were reconsidered and modified until its final model as the UTAUT. The first model that aimed to investigate the acceptance of a technology was the theory of reasoned action invented by Fishbein and Ajzen in 1975. According to the theory of reasoned action, the individuals' behaviours depend on their attitudes towards the results of their behaviour (Fishbein & Ajzen, 1975). According to the next theory, the Theory of Planned Behaviour that is

based on theory of reasoned action, a person's purpose defines whether he or she will perform or avoid a certain behaviour (Ajzen, 1991; Ananiadou & Claro, 2009). A longitudinal study was conducted to empirically compare these eight models in four organisations: the two with voluntary usage of a system, two with mandatory usage of a system (Venkatesh et al., 2003). Venkatesh et al. (2003) found that using a technology depends on individual intention to use the technology, because there is the direct effect of behavioural intention on the usage behaviour. In other words, they consider behavioural intention as a predictor for users' willingness to utilize a technology. The constructs that have had a significant effect on behavioural intention or the usage behaviour were included in the UTAUT model. These three constructs that determine the behavioural intention are performance expectancy, effort expectancy and social influence, and one constructs that has the direct effect on the usage behaviour is facilitating conditions (Venkatesh et al., 2003). Venkatesh et al. (2003) revealed that there are four moderators: age, gender, experience and voluntariness to use. Their effects will be discussed further. **Performance expectancy** indicates a degree to which a user believes that using a new technology will help to improve work performance. Performance expectancy has a significant direct effect on behavioural intention to use a new technology. In other words, the more confident the user is in the utility of the program for achieving working tasks, the more likely he or she will use it. Therefore, performance expectancy is a strong predictor of behavioural intention. Performance expectancy is moderated by gender and age, in particular, the effect of performance expectancy on predicting behavioural intention is stronger for younger men. **Effort expectancy** can be defined as a users' perception of a degree related to how easy to use the system. The easier it is for an adopter to use the system from his or her perspective, the more likely he or she will use it. Moderators for effort expectancy are gender, age and experience. Thus, the effect of effort expectancy on predicting behavioural intention is stronger for younger women with little experience. The effect disappears with increasing experience. **Social influence** is the degree to which a user perceives the importance of others' opinion that he or she should use a new system. Age, gender, voluntariness to use and experience moderate the effect of social influence in predicting behavioural intention. The effect of social influence was found significant only in mandatory settings, particularly, for users with little experience. Moreover, the effect of social influence on predicting behavioural intention is stronger for older women. **Facilitation conditions** indicate the degree to which a user believes that there is an organizational and technical infrastructure to support the usage of the system. Even though facilitating conditions did not have a significant impact on the behavioural intention, it was still included in the model because facilitating conditions had a direct effect on usage behaviour. Worth to mention, that the effect of facilitating

conditions is moderated by experience and age, hence the effect is increasing with experience and age. Figure 1 shows the original UTAUT model invented by Venkatesh et al. (2003).

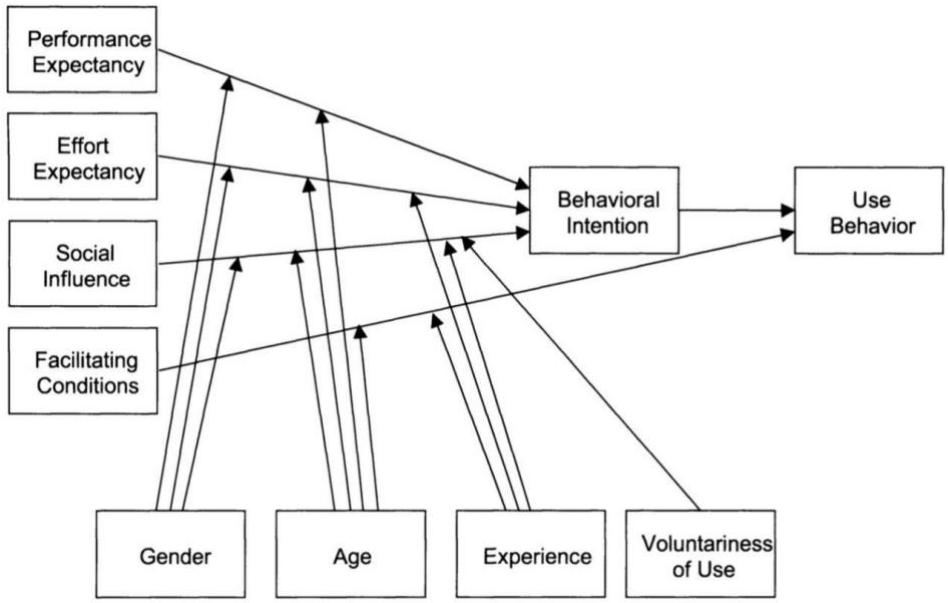

Figure 1. The unified theory of acceptance and use of technology (UTAUT) model (Venkatesh et al., 2003).

The role of results in predicting behavioural intention

Results demonstrability is a construct derived from the innovation diffusion theory, and it was not included in the UTAUT because there was no significant effect neither on behavioural intention nor on usage behaviour (Venkatesh et al., 2003). Nevertheless, Moore and Benbasat (1991) who invented the innovation diffusion theory, included the construct of results demonstrability that helps to understand the adopters' perception of a technology. Results demonstrability is how results of using the technology are visible and observable for users, in other words, it is users' "ability to measure, observe, and communicate the results of using the innovation" (Moore & Benbasat, 1991, p. 203). They found that results demonstrability is one of the determinants of the technology adoption. Important to mention, that they used this construct as a users' own perception of the results of using the technology. Adopters' perception of the new system affects its acceptance and future use (Moore & Benbasat, 1991). Moreover, Fishbein and Ajzen (1975) argue that users' behaviour depends on their attitudes towards the results of their behaviour. Therefore, it can be concluded that results demonstrability is an important variable to understand adopters' behaviour and predict acceptance. In practising PSS, results demonstrability can be understood as users' perception that they have improved their ability to give a speech in front of the audience in VR: it is their perception of progress in improving PSS. Thus, one can assume that progress may

have an effect on predicting behavioural intention to use a technology, and consequently on adoption to use the technology. The perception of the results can be measured with implying self-assessment while measuring progress.

Most studies that aimed to understand users' acceptance of the technology have been carried in the work context (e.g. Moore & Benbasat, 1991; Davis, 1993; Venkatesh et. al., 2003), while only a few aimed to investigate users' acceptance of new technologies in the educational settings (Kurt & Tingöy, 2017). Similarly, with the working context, it can be assumed that the success of implementing the new technology for learning purposes depends on the acceptance and usage of this technology by users. With the developing of technologies, VR offers great opportunities for the educational field (Dalgarno & Lee, 2010; Cruz-Neira, Fernández, & Portalés, 2018). Thus, the goal of this study is investigating students' acceptance of the VR technology in the educational context, particularly, students' acceptance of the VR training for PSS. Further, the VR technology for education and training PSS will be discussed in more details.

Virtual reality in education

VR technology is the three-dimensional computer-generated technique that allows a user to interact with the virtual environment and virtual objects (Chang et al., 2016). VR can be used for training different skills, such as vehicle driving skills, medical-surgical skills, firefight skills and others. It is possible due to get the immersive feeling of VR and interactivity that allow learners to play an active role in the virtual learning environment (Chang et al., 2016). The immersion feeling, is also called presence, depends on immersion of a VR environment itself. Immersion describes what any particular VR environment provides in terms of the extent to which the illusion of reality is inclusive, extensive, surrounded and vivid (Slater & Wilbur, 1997). According to Slater & Wilbur (1997), "presence is a state of consciousness, the (psychological) sense of being in the virtual environment" (p. 4). Slater (2003) defines presence as "a human reaction to immersion" (p. 2). Presence is crucial for skill training as a response that can be transferred from VR to real-world behaviour (Slater, 2003). Basically, an indicator of presence is when people behave in a VR environment similar to how they would behave in an analogous real-life situation (Slater, 2003). In other words, the sense of immersion possible to get when users feel the environment in which they act very similar to reality and they behave as they would behave in reality. To achieve this, VR applications are created to resemble the real world. A virtual environment is settings where users can be involved in real-time situations generated with computer technologies (Hussin, Jaafar, & Downe, 2011). One of the

important features of the virtual environment is interactivity, that enables users to interact with the data presented in the VR system (Dalgarno & Lee, 2010). Dalgarno and Lee (2010) include several meanings in the construct of interactivity, for example, it is users' actions to control of virtual environment attributes, navigate in the virtual environment and manipulate objects. Interactivity in VR allows learners to play an active role in the virtual learning environment where they can practice several times safely until they master any skills (Chang et al., 2016). In the virtual environment the context can be adapted to the user's needs, allowing the user to operate in a safe environment where making mistakes leads to minor consequences compared to a real-life scenario (Batrinca, Stratou, Shapiro, Morency & Scherer, 2013; Poeschl, 2017; Nazligul, et al., 2017).

From the 1980s a wide range of studies has been conducted to examine the effectiveness of using VR applications in education (Pantelidis, 2009). There are some advantages and pitfalls of using the virtual environment for educational purposes that will be discussed further.

Pitfalls of using VR for educational purposes.

The main obstacle of implementing VR in the educational field is the cost issues (Dalgarno & Lee, 2010). Because the integration of a VR system in an organisation requires special software and equipment, this is expensive. Another barrier is a lack of knowledge among teachers and students how to use the virtual environment to achieve learning goals (Dalgarno & Lee, 2010). Activities in the VR environment can be more difficult for participants and require more cognitive resources (Neguţ, Matu, Sava, & David, 2016). Clark and Feldon (2014) declare that even if new technologies can be more 'likeable', it does not lead to increasing a learner's level of motivation to study. The same authors state that new technologies do not produce more learning rather than a live teacher or older media. Nevertheless, it is important to elaborate on this statement. From Clark's and Feldon's (2014) review it follows that there are two types of research where new and older media compared. The first one can be characterised by using different content for new and old media or a teacher. Therefore, they concluded that new media does not lead to superior learning, but the difference in the content presented for learners. While in other experiments with using the same context, there was no significant difference in learning gains between using new and old media (Mayer, 2014). Consequently, a comparison of using the VR technology and older technologies seems controversial. VR tools and any other tools can be used for educational purposes in different ways and compare them objectively can be even impossible. This statement will be discussed further in more details.

Advantages of using VR for educational purposes.

Using VR applications may be appropriate in cases where utilising any other approaches or tools can be hard or impossible due to time, money or safety issues. First, VR can help in the development of spatial knowledge that impossible to realise in reality (Dalgarno & Lee, 2010). For example, Campbell, Collins, Hadaway, Hedley and Stoermer (2002) describe the virtual environment that represents marine and coastal environment to support graduate students in studying Ocean Science. The learners can walk over, swim underwater and explore the ecosystem and ocean environment, that hard to implement in real life. Second, VR can help to perform tasks that are risky, expensive or dangerous in real life, for example, training for firefighters (Vichitvejpaisal, Yamee, & Marsertsri, 2016) or surgery practice (Zhang, Chang, Yang, & Zhang, 2017). The final goal of many learning processes is to apply obtained knowledge and skills into different contexts out of the classroom. Dalgarno and Lee (2010) assumed that if VR technologies can create an immersive environment that is close to the real world, therefore, knowledge and skills obtained in a virtual learning environment should be easily applied in similar real situations. Even though this topic is of great importance, there is a lack of research that studies transferring skills obtained into VR to real-life performance. For example, Lammfromm and Gopher (2011) studied acquisition and transfer perceptual-motor skills, such as juggling, and found that experimental group that trained in VR and control group that trained in real-life settings did not have a significant difference in results. The study of Rose et al. (2000) points out that VR training was as effective as non-VR performance in practising sensory and motor elements of tasks. However, some research found that skills obtained in VR are appropriate and suitable only for VR but not in real life (for example, see Kozac, Hancock, Arthur & Chrysler, 1993), but training these skills seems questionable. In short, using VR technologies in education has proven to be effective, especially for obtaining comprehensive knowledge and practising complex behaviour. Using a virtual environment for training skills of presenting in public will be discussed in the next part.

Virtual reality for PSS

As mentioned earlier, virtual reality simulations can help learners to master skills and execute learning tasks. Simulations are suitable for tasks associated with expensive, dangerous or risky performance in the real world (Dalgarno & Lee, 2010). Presenting in front of a large audience may be a risky task because a learner should cope with the public speaking anxiety. For example, Kothgassner et al. (2012) in their study found that presenting in a virtual classroom leads to the increasing level of insecurity and anxiety, and it also influences rising heart rate that is an indicator

of stress. The main goal of their study was to train people with anxiety to speak in public. For the study, a virtual environment was created that resembles a big lecture hall with an adjustable number of virtual listeners. The research consisted of two parts. The objective of the first part was to compare two groups that presented in front of the virtual audience (experimental group) and an imaginary audience (control group). The second study aimed to investigate the predictors of users' perception of the usefulness of the VR training. The sample for the first part of the study consisted of 50 university students. To measure social insecurity, anxiety and perceived reality (how real participants perceived the virtual environment) Kothgassner et al. (2012) made use of questionnaires with a 4-point Likert-scale (from strongly agree to strongly disagree with the statement provided). They measured the stress level by recording the heart rate activity during the speech. Results show a higher level of social insecurity, anxiety and perceived level of realness in the experimental (VR) group, as well as higher heart rate throughout the presentation. In other words, participants perceived the virtual environment as more stressful than presenting in front of an imaginary audience. The second part of the study included a larger sample of students (N = 137). Participants presented in the same virtual environment as in the first study. Then they were asked to fill the questionnaires about the technology acceptance (using the technology acceptance model) to understand the users' perception of the usefulness of the virtual environment. The results indicate that participants perceived the technology as usable and useful. Therefore, these authors conclude that VR tools are relevant for overcoming social phobias, such as public speaking anxiety. Kothgassner et al. (2012) concluded that the stronger a users' feeling of being present in the virtual environment, the better will be the transfer of obtained knowledge and skills into reality. It follows that using a VR application for training PSS leads to an immersive feeling that helps to realise the scenario close to reality, that can lead to better transfer obtained knowledge and skills in real cases. The best way to improve presentation performance is to repeatedly practise in front of an accustomed and merciful public (Batrinca et al., 2013; Chollet et al., 2015), a kind of audience that can be easily generated in a virtual environment. While it is complicated to arrange a human audience in front of which to practice oral presentations, a virtual audience is available at all times (Batrinca et al., 2013). However, the only practice might be not enough. Another way to improve performance and achieve desired outcomes is information about current performance and what needs to be improved. For these purposes, learners should get feedback about their behaviour and information about the standards associated with desired outcomes. This topic will be discussed in details in the next section.

The role of feedback and self-assessment for mastering PSS

De Grez (2009, p. 5) defines oral presentation competence as: "the combination of knowledge, skills, and attitudes needed to speak in public in order to inform, to self-express, to relate and to persuade". One of the ways to support students in developing and improving oral presentation skills is feedback or assessment. Assessment is one of the essential parts of learning processes and evaluation procedures. It is necessary to distinguish between formative and summative assessment as they are different in nature and serve different goals. Formative assessment aims to support learning, while summative assessment plays a crucial role in accreditation or summarizing learners' results (Wiliam & Black, 1996). Sometimes it is hard to draw the line between these two concepts because summative assessment can have formative functions, and vice versa (Wiliam & Black, 1996). However, many principles of summative assessment do not apply for formative purposes (Sadler, 1989). More precisely, all assessments can maintain summative functions, but only some can serve formative functions (Wiliam & Black, 1996). According to Sadler (1989), the main difference between formative and summative assessment is in their goals and effects on the learning. Summative assessment is usually given at the end of the unit or program with the purpose of grading, certification, summarizing students' results and reporting it (Sadler, 1989). This type of assessment does not require active learners' involvement and it does not normally influence learning per se (Sadler, 1989). One can assume that resulting grades at the end of the study program cannot be a good tool for improving student' outcomes regarding the program. In contrast, the formative assessment includes judgements about students' performance to enhance students' results (Hattie & Timperley, 2007). Formative assessment can be defined as information about the quality of learners' performance for enhancing their results (Sadler, 1989). The key element of formative assessment is feedback that helps assess and improve student performance (Sadler, 1989; Falchikov, 2005).

Hattie and Timperley (2007) define feedback as "information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (p. 81). Nicol and Macfarlane-Dick (2006) define feedback as information about a student's learning progress and performance in achieving learning goals and standards. The goal of feedback is to give students information about learning tasks to fill the gap between the current situation and the desired results (Sadler, 1989; Hattie and Timperley, 2007). Hattie's (1999) synthesis across more than 7,000 studies showed that feedback (such as cues and reinforcement) has a positive effect on learners' task performance. Additionally, different authors state that

feedback and assessment play a crucial role in the learning cycle of developing complex behaviour (Sadler, 1989; Nicol & Milligan, 2006), such as developing oral presentation skills (De Grez, 2009; De Grez, Valcke and Berings, 2010). Black and Wiliam (1998) made a review of more than 250 studies about feedback conducted from 1988. The results show that feedback has a significant positive effect on learning achievements across all domains, knowledge, different kinds of skills and levels of education (Black & Wiliam, 1998). Van Ginkel, Gulikers, Biemans and Mulder (2015) in their review concluded that feedback plays a key role in improving oral presentation performance, and student who had feedback performed better than students who had no feedback. Both these studies examined three sources of feedback: from the self, the teacher and the peer.

Self-assessment.

Self-assessment as a type of feedback that can help learners to get information about their current progress and fill the gap between current performance and desired results (Sadler, 1989; Hattie and Timperley, 2007). In contrast with teachers' and peer assessment, self-assessment is an internal source of feedback (Nicol & Macfarlane-Dick, 2006), that can be associated with a real understanding of your behaviour (Tsang, 2018). Self-assessment also stimulates reflection on learning progress (Nicol & Macfarlane-Dick, 2006). Self-assessment skills are very important for different parts of our life to understand our strengths and weaknesses. The attribute of self-assessment is that learners play a central role and they are involved in active participation in a process of giving and receiving feedback, monitoring, evaluating and supervising their progress and achieving learning goals (Nicol & Macfarlane-Dick, 2006). Self-assessment is also part of formative assessment when a learner begets relevant information about his/her performance (Sadler, 1989). This information includes a review of his/her knowledge, abilities and skills (Hattie & Timperley, 2007). The process of self-assessment consists of observing and changing behaviour by identifying and correcting mistakes (Hattie & Timperley, 2007). Self-assessment activities are a good way to foster reflection on learning headway (Nicol & Macfarlane-Dick, 2006). Falchikov and Boud (1989) argue that self-assessment can be conducive learning activity even with disagreement with teachers' assessment, and can equip a student with information necessary for learning. While peer and expert assessment might be perceived by learners as threatening for self-esteem (Hattie & Timperley, 2007), self-assessment helps the learners to notice critical situations before receiving feedback from teachers and peers, then learners are not at the risk of losing face (Tsang, 2018). Van Ginkel et al. (2015) concluded that self-assessment is essential for mastering public speaking skills.

In self-assessment, students use criteria and apply standards to judge their performance (De Grez, 2009). Tsang (2018) adds that self-assessment skills provide to learners with great opportunities to constantly improve their performance, particularly, oral presentations. Self-assessment stimulates reflection on our own behaviour, observing and evaluating others' actions (Tsang, 2018). Self-assessment fosters a learner to think of what can be improved in his/her presentations instead of relying only on teachers' feedback (Tsang, 2018).

Teacher feedback.

Teachers can support learning by setting and/or clarifying objectives, increasing dedication and effort to achieve these objectives through feedback (Hattie & Timperley, 2007). Teachers use feedback for making decisions about a students' level of readiness, identifying problems and its correction (Sadler, 1989). Students use teachers feedback to recognise strengths of their (students') actions that can be amplified and potentiated, identify weaknesses to be refined or improved (Sadler, 1989), and assess their progress as well as an understanding of goals and standards (Nicol & Macfarlane-Dick, 2006). In practising public speaking skills, teachers' feedback plays the role of the standard or baseline with what the other types of feedback (self and peer) are compared. Studies from last decades emphasise the importance of assessment on a learning process and display the moving responsibilities for assessment from teachers to students (Nicol & Milligan, 2006). This shift is not only of educational nature but also can help to lower teachers' amount of work. The way to involve students in the assessment process is to influence them to participate in assessment procedures via peer- and self-assessment.

Peer feedback.

Peer feedback, as well as teachers' ones, is the external source of feedback (Nicol & Macfarlane-Dick, 2006) that can foster learning in a wide range of ways. For example, peers can equip each other with alternative points of view on a subject and with strategies to execute learning tasks. By sharing thoughts, peers can get new insights, revise their own understanding and create new knowledge through discussion (Nicol & Macfarlane-Dick, 2006). Through observation while practicing skills, such as public speaking skills, learners evaluate others' performance and compare it with their own using assessment criteria (De Grez, Valcke, Roozen, 2012). Additionally, they create better understanding of these criteria (De Grez et al., 2012). Therefore, providing and getting peer feedback is not a passive process for the students, but the type of active learning. Van Ginkel et al.

(2015) conclude that engaging peers in assessment of oral presentations plays an essential role in developing public speaking skills. However, effect of feedback varies depending on the source of feedback, its type and the way it is provided (Hattie & Timperley, 2007). The comparison of the effects of different feedback sources on developing oral presentation competencies will be discussed further.

Comparison of feedback sources (for PSS).

The difference in marks between peers and teachers' assessment of oral presentations is a topic of a plethora of research, but the results are inconsistent (De Grez et al., 2012). The same is accurate to say about the comparison between self-assessment and the instructor's assessment of oral presentation skills, where the results are equivocal (De Grez et al., 2012). For example, Van Ginkel, Gulikers, Biemans and Mulder (2017) found that teachers or tutors' feedback in terms of developing technical and reflection skills is considered "as more valuable, because of tutors' knowledge and authority" (p. 1675). In turn, these researchers conducted the quasi-experimental study among undergraduate students to investigate the effectiveness of different sources of feedback, such as teacher and peer feedback and self-assessment, on behaviour, cognition and attitude towards oral presentations. Participants were 144 first-year bachelor students participated in five similar oral presentation courses of a Dutch university. There were four feedback conditions: (1) teacher feedback; (2) peer feedback; (3) self-assessment and (4) peer feedback guided by tutor. For all these conditions they used the same rubric created to evaluate four main presentation criteria: the content of the presentation, the structure of the presentation, interaction with the audience and delivery of the presentation. The results show significant progression between first and second presentation performances. They found that behaviour appeared to be more sensitive than cognition and attitude for the source of feedback. Particularly, these scientists revealed teacher feedback had a substantial effect on the behaviour. They came up with an explanation of these results that teachers used the assessment tool (rubrics) more effectively than peers. In other words, they assumed that teachers and peers understood the rubrics differently. Thus, Van Ginkel et al. (2017) assumed that more detailed rubrics can help peers to understand the rubrics better, and therefore provide better and more valuable feedback. However, they did not examine this assumption. The effect of self-assessment for developing PSS in their study was limited. However, analysis of data collection process showed that more than half of students from the self-assessment condition group did not return reflections form. Therefore, authors supposed that not every student from that group pondered at their first presentation to improve second presentation performance.

De Grez et al. (2012) conducted the study with 57 first-year university students in order to discover the level of agreement between self- and peer assessment with the assessment of university teachers with regards to practising public speaking skills. They developed rubrics with nine aspects assessing oral presentations, including content-related criteria (e.g. structure of the presentation), delivery (e.g. vocal delivery, body language) and general quality (professionalism). They used the five-point Likert scale for each item. The questionnaire included seven questions about the perception of peer assessment with the use of a ten-point Likert scale. Presentations were assessed by 5 teachers (teacher feedback), 47 students (peer feedback) that did not belong to the sample of the study, and by presenters themselves (self-assessment). Teachers, peers and presenters received instructions on how to use the rubrics. The results show that teachers scored significantly lower than peers. Moreover, the gender of the assessor and gender of the assessee had no significant effect on teachers' feedback, but it was significant for peers. Male peers rated female presenters higher than female peers did, hence female presenters got higher scores. Self-assessment grades were mostly higher than teachers' ones, and they did not depend on gender. De Grez et al. (2012) explained the difference in scores by tacit knowledge of the teachers. Even though the instructions of how to use evaluation rubrics were provided to all participants involved to the study, De Grez and colleagues assumed that teachers have tacit knowledge (and more experience) in assessing PSS and that they used it even unconsciously while evaluating the presentations (De Grez et al., 2012). They retrieved from their memory more information than was provided and/or included in the instructions and rubrics (De Grez et al., 2012). Nevertheless, the perception of peer and self-assessment was mainly positive, participants pointed out that they learnt a lot from the assessment. Hence, De Grez et al. (2012) concluded that giving to students the opportunities to get both peer and self-assessment can lead to sufficient amount and quality of formative feedback. In contrary, Tsang (2017) argues that students can have a different attitude towards feedback because of ambiguity and unclarity in feedback on PSS. Undoubtedly, that potency of giving and receiving feedback depends on certain circumstances, such as learners' background, prior knowledge and experience. For example, students with different study background may use different terms, and therefore, may struggle with understanding each other while giving and receiving feedback. If the student who gives feedback does not know the criteria of providing good feedback and has never done it before, thus one can assume that the quality of his/her feedback may be low. To improve someone's performance, feedback must be clear, effective and equip learners with the necessary information. To be effective, feedback must answer three main questions: Where am I going? (What are the standards or goals to achieve?), How am I doing? (compare the current level of performance

with the desired result, the progress that has been made to achieve the goal), and Where to next? (actions need to be carried out to close the gap and achieve the goal) (Sadler, 1989; Hattie & Timperley, 2007). Hattie and Timperley (2007) state that effective feedback is "clear, purposeful, meaningful, and compatible with students' prior knowledge and to provide logical connections" (p. 104). To equip participants of the study with a decent tool for self-assessment, evaluation rubric was created that will be discussed in the next section.

Theoretical base for questions in self-assessment rubrics.

Information can be considered valuable for feedback when it includes evaluation of progress and/or how to achieve better performance (Hattie & Timperley, 2007). Sadler (1989) argues that learners need to be provided with a standard of performance that they can set goals and aspire to achieve this level. Thus, the questions for self-assessment were created considering the abovementioned. The questions for the self-assessment rubrics in the current study were formulated to provide to students the standard or goals to achieve, that help to answer the first feedback question "where am I going?". Students evaluated their own performance by agree or disagree with the statement provided in order to get an answer for the second feedback question "how am I doing?". These interventions were assumed to help showing and filling the gap between current performance and desired outcomes, that is the main goal of feedback (Sadler, 1989). To answer the third feedback question, the open-ended questions were added to the questionnaires where students formulated what they want to improve during the next time of presenting. However, these answers were not analysed in the scope of this study. To measure the progress, this study focused on vocal and speech-related features, particularly, on the variation of pitch and pauses. This choice was made considering the ability to gather data, as well as features of the VR application. In the VR environment, it is complicated to gather information about movements and face expressions because a participant is wearing glasses, and there is usually limited space for movements. Using hands is also limited because a user has controllers to operate in the VR app. Conversely, vocal features can be gathered by the application itself or using an audio recorder. This data can be easily assessed by participants without special preparation, only with rubrics provided. Also, related research (e.g. Tsang, 2018) revealed that vocal features, such as variation of volume and pitch, are among constructs of oral presentations that were significantly improved throughout the experiment. The questions for assessing vocal features in practising PSS were formulated considering the existing literature and research that discussed below.

Variation of pitch.

Pitch is the highness or lowness of the speaker's voice. It is used to give subtle meaning to sentences. The use and variation of pitch are referred to as intonation or inflexions, yet the words "pitch", "intonation" and "inflexions" are often used synonyms (Seattle Learning Academy, 2016; Lucas, 2012). The success key of the oral presentation is when the speaker's use his or her voice in a way that helps listeners navigate in the presentation, while disuse of pitch variation affects an audience's ability to recall information and can lead to monotonous speech (Hincks & Edlund, 2009). According to Hahn (2004), intonation is used to emphasize the importance of different parts of a speech and to allow the listener to distinguish sentences, paragraphs and topics. Furthermore, a speaker's high level of variation of the pitch has an impact on the audience perception of the speaker's liveliness and charisma (Hincks, 2005; Strangert and Gustafson, 2008).

Pauses.

Hincks and Edlund (2009) argue that another factor of a successful oral presentation is the speaker's ability to optimize the use of pauses to allow the audience to more easily navigate the content being presented. According to Neil et al. (2003), the integration of pauses not only helps the audience make sense of the presented content but also increases the presentation attractiveness, which in turn leads to higher levels of audience engagement. Furthermore, placing pauses before and after a word or sentence can help to emphasize those keywords or sentences that a speaker wants the audience to pay more attention to (Neil et al., 2003). A presentation is usually a monologue but pauses help to make it more interactive and livelier and to create the feeling of a real conversation. Regarding poor pause implementation, if the speaker does not modulate their voice to facilitate access to the content, the main idea of the message can be lost (Hincks, 2005). Collins (2004) states that the best way to lose listeners' attention is to speak in a soft, monotone voice. Therefore, voice variations, such as pauses, pitch and loudness, should be implemented by the speaker in combination with facial and body gestures (Hincks, 2005).

Research model

PSS are important for our life, and for university students particularly. Thus, universities have to include developing oral communication skills in curriculum and/or provide to students needed support and resources to practice. However, presenting in front of a real audience can be troublesome: expensive for the university, time-consuming for all participants involved and even

frightening for presenters. Therefore, training in a VR learning environment can be a solution. While implementing a new technology it is important to consider users' acceptance of the technology. Without acceptance, users will not use the new system, or the results will be negligible. Moreover, the visibility of the results while using the new system can also affect acceptance. To understand and predict acceptance of a technology, the UTAUT model can be used. In the current study to understand students' acceptance of the VR training for practicing public speaking skills, the UTAUT model was used with some changes. Age as a moderator was not included in the model of this study due to irrelevance to answer the research question. The moderator voluntariness of use was also excluded from the model because all students participated in the study voluntarily. Gender as a moderator was included in the research model with effect on the relationship between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention. A progress variable has been added to the model playing the role of the construct of results demonstrability (RD), as they have similarities in the nature. Progress was added as a moderator for relations between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention, but as a possible direct determinant of behavioural intention. The model with all variables is present below in Figure 2.

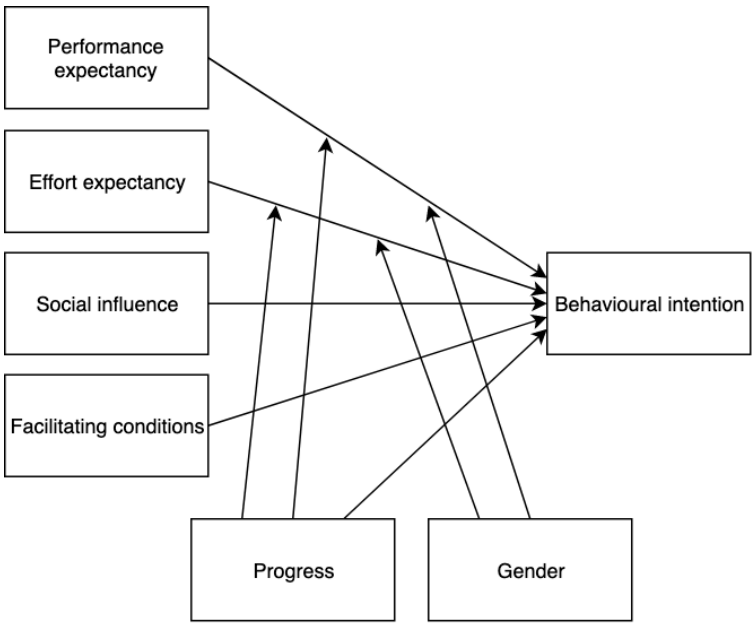

Figure 2
Research model on the basis of the UTAUT model with adding the progress construct

It was expected that social influence and facilitating conditions will not have a significant effect on the behavioural intention in this study. Social influence appeared to be significant in mandatory

settings but not in voluntary settings (Venkatesh et al., 2003). All participants took part in the present study voluntarily, therefore, social influence is not expected to be significant in predicting behavioural intention to use the VR training. Another reason why social influence was not expected to be significant is that participants did not communicate with each other about using the VR application before the experiment, therefore, they could not influence each other to use or not use the VR training. In the study of Venkatesh et al. (2003), facilitating conditions did not have a direct significant effect on behavioural intention, but it had a significant effect on use behaviour. Even though to measure use behaviour is not in the scope of this study, it was decided to leave the facilitating conditions construct in the questionnaire. Therefore, it is expected that only performance expectancy and effort expectancy will have a significant correlation with behavioural intention.

Research question(s)

According to the above mentioned, the study aimed to answer the following research questions:

1. What is the relationship between students' progress in improving public speaking skills and students' technology acceptance of VR training for mastering these skills?

Technology acceptance includes such constructs as performance expectancy, effort expectancy, facilitating conditions, social influence and behavioural intention. The first question aimed to investigate whether the progress has direct effect on behavioural intention, and what is the relationship between progress and other constructs of the UTAUT model. As was mentioned above, results demonstrability is the users' perception of the results of using the technology. Moore and Benbasat (1991) found that it is an important determinant of intention to use the technology. Even though they conducted the study in a different field, similar results are expected: progress will have a positive effect on acceptance of the technology, and particularly on behavioural intention. Thus, the first hypothesis is:

H1. Progress will have a significant positive effect on students' technology acceptance of VR training for mastering PSS, and particularly on behavioural intention.

It follows that progress will have a positive effect on performance expectancy and effort expectancy, and therefore, may be a moderator for relations between performance expectancy and behavioural intention, and between behavioural intention and effort expectancy. That leads to the research questions:

2a. How does progress moderate the relationships between performance expectancy and behavioural intention?

2b. How does progress moderate the relationships between effort expectancy and behavioural intention?

Progress in improving oral presentation performance is strongly related with performance expectancy, as the latter defines a degree to which the user believes that using the technology will help to achieve gains in job performance. Construct of performance expectancy is also associated with usefulness and extrinsic motivation (Davis, 1993). Therefore, the higher the person's progress the more likely he/she perceives the system as useful, the more likely he/she adopt the system. That leads to the hypothesis:

H2a. Progress will moderate the relations between performance expectancy and behavioural intention, such that the effect will be stronger for student with the higher progress.

The students who will get better progress will perceive the technology as easy to use. For people who make the progress quite easy without putting lots of efforts, the relationship between effort expectancy and behavioural intention are expected to be less strong, rather than for students who put more effort to improve their skill. Thus, the assumption is that effort expectancy will be most salient for student with less progress and less salient for students with less progress. That leads to the next hypothesis:

H2b. Progress will moderate the relations between effort expectancy and behavioural intention, such that the effect will be stronger for student with the higher progress.

Gender is a moderator for performance expectancy and effort expectancy from the original model of Venkatesh et al. (2003) that is also included in the research model of this study. Therefore, the research questions are:

3a. How does gender moderate the relations between performance expectancy and behavioural intention?

3b. How does gender moderate the relations between effort expectancy and behavioural intention?

The same results as in the study of Venkatesh et al. (2003) are expected in the current study, that leads to the next hypotheses:

H3a. Relations between performance expectancy and behavioural intention will be moderated by gender, particularly the effect will be stronger for men.

H3b. Relations between effort expectancy and behavioural intention will be moderated by gender, particularly the effect will be stronger for women.

To the best of our knowledge research on the topic of practising PSS in VR in higher education is limited. Most of these studies were conducted either for decreasing the fear of public speaking like a part of therapy (Wallach, Safir, & Bar-Zv, 2009) or without using VR tools (e.g. Neil et al., 2003; Hincks and Edlund, 2009; Collins, 2004). Also, Dalgarno and Lee (2010) noted that more research is needed to bring VR and educational communities together to start a dialogue and fruitful discussion about the effective use of VR for educational purposes. Teacher and learners need time to figure out how to use new technology properly, as well as guidance in order to achieve a better effect (Dalgarno & Lee, 2010). Tsang (2018) indicates that their rubric for assessment can be adapted and used in other manners and settings, which will help to understand more deeply how learners' PSS can be improved. Hence, this study's findings will add to our current knowledge base on how to use VR applications for practising oral presentation skills more effective. The results are also expected to be interesting for practitioners and developers of VR applications who are searching for ways to provide appropriate learner-support.

Acceptance of using a new technology with the UTAUT model is of a plethora of research, especially in the working context (Venkatesh, Thong, & Xu, 2016). However, there are not lots of studies investigating the technology acceptance in the educational context. Moreover, the VR technology is relatively new in education. Therefore, this study aimed to gain insights into adopting the VR training in the educational context.

Additionally, the results of this study are expected to be valuable for universities that want to support their students with relevant tools for practising PSS. It might also be valuable to vocational education institutes and even schools that want to equip their learners with the necessary knowledge and skills of how to present in front of an audience. In this vein, this study strives to add to the ongoing search for effective instructional support in using VR for practising oral presentation skills.

Method

Research design

A quasi-experimental quantitative research design was used in this study. A questionnaire was used to support self-assessment and gather quantitative data. The quantitative data leads to the more explicit and objective outcome than qualitative data, which in turn makes results more representative (Babbie, 2010). All variables were derived from these questionnaires and were quantified using the statistical program SPSS. A correlational design and moderation analysis were used with the variables: progress, behavioural intention, performance expectancy, effort expectancy, social influence, and facilitating conditions.

Participants

The participants were bachelor's and master's students from the University of Twente, a technical university in the Netherlands. The respondents were studying in different faculties and following different courses, thus their levels of presentation skills vary, as well as their age, gender and nationality. They were expected to have university-level of the English language. Twenty-three students participated in the experiment, but not all of them filled in the questionnaire that includes questions from UTAUT, therefore the results of only 20 questionnaires were included in the test. The Little's missing completely at random (MCAR) test showed no significance, that indicates that data were missing randomly. The results of one of the participants were removed from the data set due to a significant difference with the rest of the responses. Particularly, the results were well below the majority of other cases (see matrix in Appendix 3). This respondent was considered as an outlier and thus the data was removed to not to affect the results. Thus, only 19 questionnaires were analysed. The overall sample (N = 19) consisted of 9 bachelor students (47.4%) and 10 (52.6%) master students. 6 of them were men (31.6%); 13 women (68.4%). They were being asked in advance to fill in a consent form in which they agreed to the researcher collecting their data for the experiment. The results of the experiment sent to them personally via email.

The participants were found using snowballing and voluntary sampling techniques. To find and approach people, different ways were used. The experiment was promoted for bachelor students who need to practice presentation skills in their program (International Business Administration students) and for master students. Social media, such as master students' Whatsapp groups, were also used to approach people.

Instrumentation

To gather quantitative data, the questionnaire was created to help students evaluate their own learning process. The questionnaire included questions about vocal features to measure the progress in improvement PSS, as well as questions from the UTAUT to measure technology acceptance. The rubrics about vocal features were created for this study, while questions for technology acceptance were derived from Venkatesh et al. (2003). The questionnaire is present in Appendix 1. The aim of the questionnaire was twofold. The first is to support and guide students through the self-assessment process. The second is to make progress visible for students and gather the data about progress. Seven-point Likert scale questions were used for all items in the questionnaire, where 1 was the negative end of the scale and 7 being the positive end of the scale. The questionnaire was created using Qualtrics. The reliability analysis of the scales will be discussed in the results part.

Presentation skills.

To measure progress in improving public presentation performance, the self-assessment rubrics have been created. The questionnaire consisted of four questions about vocal features: two questions about variation of pitch and two questions about pauses. Thus, progress for each presentation performance was computed as the mean score of all four grades about vocal features. The goal of the study was to investigate the relations between overall progress and technology acceptance, therefore, all vocal features items were computed together in order to get the progress variable. The overall progress was calculated as the difference between means of the first and last presentation performance. The second presentation performance was not included in the analysis, because the main goal was to measure progress as a final value once in the time, but not like a dynamic feature that changes throughout the time, for example, as experience. The questions regarding vocal features were constructed as a personal statement of using the vocal features, and participants should mark in which extent they agree or disagree with the statement. The statements were formulated in a way to give a positive example of using vocal features in a presentation. For example, ‘I used pitch variation (changing the intonation) during the presentation all the time’. The questionnaire was created in a way that users could see their marks from the previous presentation performance. Therefore, they could score themselves higher or lower in comparison with the previous presentation performance.

Technology acceptance.

The questions for measuring technology acceptance derived from the UTAUT model of Venkatesh et al. (2003) were slightly reformulated and adapted in order to be relevant for the context of the present study. The UTAUT model includes 5 constructs. The constructs of performance expectancy, effort expectancy and social influence included 4 questions for each construct. Facilitating conditions consisted of 3 questions. Behavioural intention was measured by 2 questions. Each construct was computed like a mean of correspondent items, the results of the descriptive statistics can be found in Appendix 1.

Procedure

First, the approval from the ethics committee of the University of Twente was requested. The respondents were asked to fill a consent form before conducting the experiment, and their permission for recording speech was obtained. Then, the experiment in the VR environment was piloted with 2 students to check for any errors that need to be corrected, or for improvements that need to be made in the experimental procedure. The individual emails were sent to the participants with the description of the experiment, purpose of the study, needed preparation and their time slots. A room with the necessary equipment was arranged. The participants were asked to prepare a 5-minute presentation with PowerPoint slides. The participants received the link for the questionnaire at the beginning of the experiment while getting instructions. Participants were asked to present three times. Calcich and Weilbaker (1992) found that presenting two times was better than presenting once or more than three times. Therefore, it was decided to ask participants to present three times during the session. This decision was based on the assumption that during the session participants need some time to get used to the VR environment, thus three times of presenting seemed appropriate. Participants were asked to fill in the questionnaire containing questions about vocal features three times after each presentation performance. Progress was measured as the difference in their scores throughout the experiment. The mean for each presentation performance was counted by using self-assessment scores for each question assessing vocal features, such as variation of pith and pauses.

At the end of the sessions, participants were asked to answer the questions about their experience of training in the VR using the UTAUT model. Participants' speech was recorded and they were asked to listen to these recordings while assessing their vocal features and filling in the questionnaire. Each session lasted approximately 45-50 minutes. Students could fill in the questionnaire from their smartphones or the available computer.

Data analysis

Quantitative data was exported from Qualtrics in a format that can be used in SPSS. To find the correlation between technology acceptance and progress and conduct a regression and moderating analysis, descriptive and inferential statistics were used. Before each analysis the preliminary tests were conducted in order to check possible violation of assumptions. Reliability was calculated by using Cronbach's Alpha for each scale. The results will be presented in the results part.

Results

This study intended to investigate the relationship between progress and technology acceptance among students of the University of Twente. In the following part, first, descriptive statistics will be presented to explain the measurement and nature of the variables. Then the results of the statistical tests will be shown in order to answer the research questions.

Descriptive statistics

Items derived from the questionnaire were computed in variables that introduced the constricts of the UTAUT model. The table with mean and standard deviation for each item as well as for computed variables is present below.

Table 1
Construct Item Values and Standard Deviation

Construct item *Calculated construct*	*Measured value*	*Calculated value*	*SD*
PE1	5.74		1.05
PE2	5.11		1.41
PE3	5.11		1.49
PE4	5.26		1.15
Performance expectancy		5.30	1.04
EE1	5.95		.97
EE2	6.05		.70
EE3	6.11		.81
EE4	6.26		.73
Effort expectancy		6.09	.62
FC1	5.53		1.35
FC2	5.79		0.79
FC3	5.05		1.65
Facilitating conditions		5.46	.69
SI1	5.63		1.01
SI2	3.74		1.63
SI3	3.58		1.47
SI4	3.61		1.54
Social influence		4.14	1.18
BI1	5.16		1.58
BI2	4.63		1.80
Behavioural intention		4.89	1.50

Note: PE1-PE4 = different questions for measure the performance expectancy (PE) variable; EE1-EE4 = different questions for measure effort expectancy (EE) variable; FC1-FC3 = different questions for

measure facilitating conditions (FC) variable; SI1-SI4 = different questions for measure social influence (SI) variable; BI1-BI2 = different questions for behavioural intention (BI) variable.

The mean, standard deviation, minimum and maximum for each of the computed variables are shown in Table 2. Descriptive statistics for each measurement are presented in Appendix 2.

Table 2

Descriptive Statistics for Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, Behavioural Intention and Progress

Construct	*N*	*Min*	*Max*	*M*	*SD*
PE	19	4	7	5.30	1.04
EE	19	5	7	6.09	.62
FC	19	4	7	5.46	.69
SI	19	2	6	4.14	1.18
BI	19	2	7	4.89	1.50
Progress	19	-1	3	1.03	1.07

Note: PE – performance expectancy, EE – effort expectancy, FC – facilitating conditions, SI – social influence, BI – behavioural intention.

A paired-samples t-test was conducted to evaluate the progress between the first and last presentation performance. There was a statistically significant increase in progress scores from first performance (M = 4.00, SD = 1.22) to the last performance [M = 5.03, SD = 1.10, $t(18) = -4.18$, $p<.001$]. There was a large effect size (.49) according to guidelines from Cohen (1988). The average progress within the experiment is illustrated on the Figure 3.

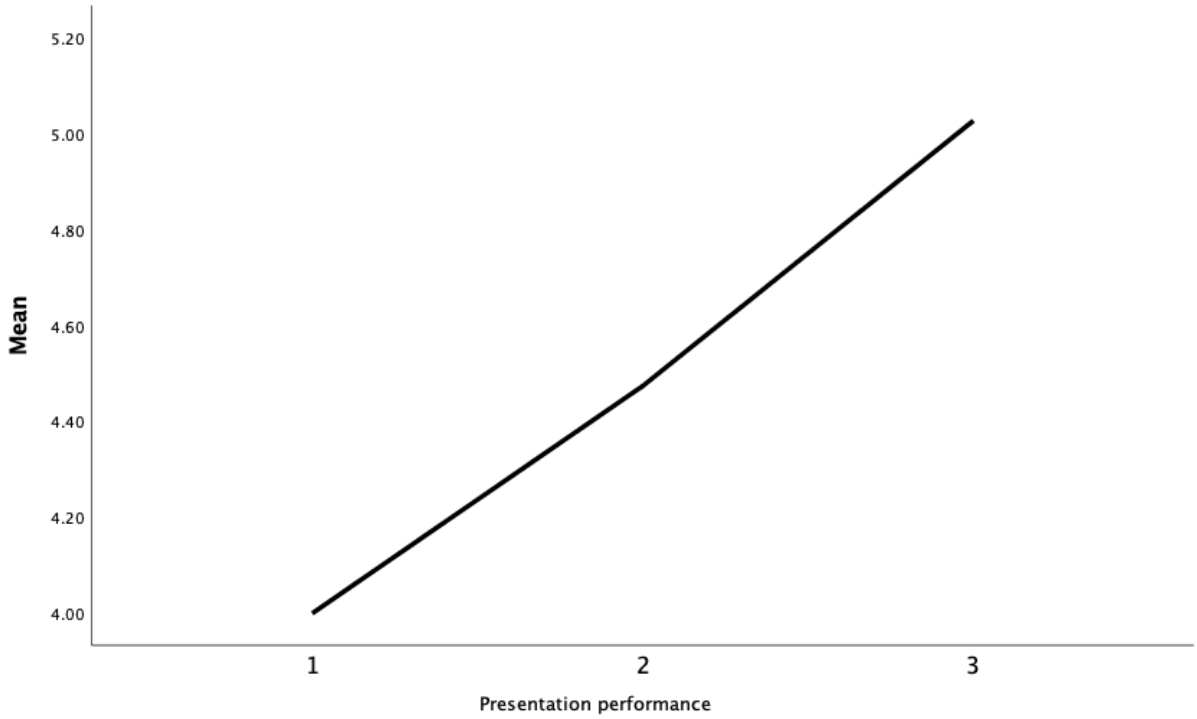

Figure 3
The changes in the mean of the progress variable through three presentation performance

Validation of results

Cronbach's alpha coefficients were computed to evaluate the internal consistency of the instruments used for measuring of pitch variation, pauses, performance expectancy, effort expectancy, facilitating conditions, social influence, behavioural intention. Alpha coefficients were higher than .72 for all of the scales, except from facilitating conditions. Alphas of .70 or above have a decent degree of reliability (Cortina, 1993). However, for facilitating conditions alpha coefficient was low (-.32). Therefore, the Cronbach's alpha coefficients were computed again to check if the deletion of one of the items would increase the reliability. However, such items were not found. Thus, Guttman's lambda coefficients were computed for this variable, but it also was found too low (Table 3). Since multiple reliability tests produced low for facilitating conditions, it was decided to exclude this variable from the correlational tests and results of the study. The results are summarized in Table 3.

Table 3
Reliability Coefficients for each Scale

Measures	Cronbach's alpha	Lambda 1	Lambda 2	Lambda 3	Lambda 4	Lambda 5	Lambda 6	Number of items
PE	.83	-	-	-	-	-	-	4
EE	.76	-	-	-	-	-	-	4

FC	-.32	-.215	.092	-.322	-.697	.139	-.069	3
SI	.87	-	-	-	-	-	-	4
BI	.72	-	-	-	-	-	-	2
Variation of pitch	.95	-	-	-	-	-	-	6
Pauses	.92	-	-	-	-	-	-	6

Note: PE = performance expectancy, EE = effort expectancy, FC = facilitating conditions, SI = social influence, BI = behavioural intention.

Correlational tests

The relationships between progress and all constructs of the UTAUT model were investigated using Pearson's correlation coefficient. Correlation coefficients with a significance of $p < .05$ were considered significant. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Cohen (1988) suggests the interpretations for the Pearson's correlation, where r =.10 to .29 is a small correlation, r =.30 to .49 is medium correlation, and r =.50 to 1.0 is a large correlation. There is a medium significant correlation between progress and behavioural intention (r=.49, n=19, p<.05), and large highly significant correlation between progress and EE (r=.63, n=19, p<.01).

The strongest Pearson product-moment correlation coefficient for the BI was with the EE scale: r=.60, n=19, p<.01. There is no significant correlation between BI and other constructs from the UTAUT model. The latter can be explained by the small sample in the study (N=19). For the small samples, even moderate correlations cannot reach statistical significance (p<.05) (Pallant, 2005). For SI and FC were expected to have no significant correlation with BI, but for PE it was assumed that correlation will be significant. FC was removed from the statistical test due to unreliability. The Pearson's correlation coefficients for all five variables (PE, EE, SI, BI, Progress) are shown in Table 4.

Table 4

Correlation Matrix for Progress, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Behavioural Intention

Measures	1	2	3	4
(1) Progress				
(2) PE	.15			
(3) EE	.63**	.34		
(4) SI	-.04	.68**	.08	
(5) BI	.49*	.38	.60**	.36

Note: **. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed). PE = performance expectancy, EE = effort expectancy, FC = facilitating conditions, SI = social influence, BI = behavioural intention.

To understand the role of the gender in relations between progress and behavioural intention, and all constructs of the UTAUT model, correlation analysis with dividing results by gender was conducted (Table 5). Interestingly, that progress has non-significant effect on predicting behavioural intention in both groups. For male students, correlation only between effort expectancy and behavioural intention was significant. For female students, correlations were significant between progress and effort expectancy (r=.56, n=13, p<.05), performance expectancy and behavioural intention (r=.71, n=13, p<.01) and between effort expectancy and behavioural intention (r=.55, n=13, p<.05). Results show that PE has a significant correlation with behavioural intention for female students (r=.71, n=13, p<.01), but not for male students (r=.63, n=6, p=.151).

Table 5

Correlational Analysis for Progress, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Behavioural Intention Divided by Gender

Measures	1	2	3	4
		Males [a]		
(1) Progress				
(2) PE	.55			
(3) EE	.79	.47		
(4) SI	-.02	.77	.10	
(5) BI	.69	.63	.84*	.50
		Females [b]		
(1) Progress				
(2) PE	.08			
(3) EE	.56*	.41		
(4) SI	.09	.58*	.12	
(5) BI	.36	.71**	.55*	.53

Note.

[a] n = 6. [b] n = 13.

* p < 0.05. ** p < 0.01.

PE = performance expectancy, EE = effort expectancy, FC = facilitating conditions, SI = social influence, BI = behavioural intention.

Regression analysis

A multiple linear regression was calculated to predict behavioural intention based on performance expectancy, effort expectancy, social influence and progress. Preliminary analyses were performed to ensure there was no violation of the assumption of normality, linearity, multicollinearity. A significant regression equation was found (F (4, 14) = 3.278, p < .05), with an R^2 of .484; that is, the model, which includes performance expectancy, effort expectancy, social influence and progress as predictors, explains 48.4 per cent of the variance in behavioural intention.

Stevens (1996, p. 72) advises that 'for social science research, about 15 subjects per predictor are needed for a reliable equation'. Thus, the sample was small for this type of regression and the R^2 value tends to overestimate of the true value in the population, therefore, adjusted R^2 can provide with the better estimation (Pallant, 2005). Adjusted R^2 = .336, that is, the model can predict 33.6% of the variance in behavioural intention. However, none of the predictors contributed significantly to the model as shown in the Table 6.

Table 6

A miltiple Linear Regression Analysis for the Model including Performance Expectancy, Effort Expectancy, Social influence and Progress

Predictor	*b*	*b* *95% CI [LL, UL]*	*ß*	*t*	*p*
(Constant)	-3.39	[-10.86, 4.10]		-.97	.35
PE	-.06	[-.94, .82]	-.04	-.15	.88
EE	1.05	[-.32, 2.41]	.43	1.65	.12
SI	.45	[-.28, 1.19]	.36	1.33	.21
Progress	.33	[-.42, 1.08]	.23	.94	.36

Note: CI = confidence interval. LL and LU indicate the lower and upper limits of a confidence interval respectively. PE = performance expectancy, EE = effort expectancy, FC = facilitating conditions, SI = social influence, BI = behavioural intention.

Significance of all these variables is quite low, thus they do not make a significant unique contribution to the prediction of behavioural intention. It can be explained by overlapping with other independent variables in the research model (Pallant, 2005). To understand the unique explained variance of the variables, the Part correlation coefficients were counted. That indicated that performance expectancy uniquely explains only .09% in behavioural intention scores. Effort expectancy has a unique contribution of 10.24% to the explanation of variance in behavioural intention. Social influence uniquely explains 6.76% and progress explains 3.24%.

Moderation analysis

Progress was examined as a moderator of the relation between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention. The analysis was conducted using PROCESS macro (Hayes, 2018) for examining a moderation effect. The results are presented in Table 7 and Table 8 correspondingly.

Table 7

The Role of Progress as a Moderator for Performance Expectancy in Predicting Behavioural Intention

Predictor	*b*	*SE*	*t*	*p*
PE	.45	.31	1.47	.16

Progress	.66	.30	2.20	.04
PE × Progress	.01	.32	.02	.98

Note: R^2 = .35. PE = performance expectancy.

Table 8

The Role of Progress as a Moderator for Effort Expectancy in Predicting Behavioural Intention

Predictor	*b*	*SE*	*t*	*p*
EE	1.23	.60	2.05	.06
Progress	.27	.40	.67	.51
EE × Progress	-.05	.49	-.09	.93

Note: R^2 = .41. EE = effort expectancy.

For both variables (PE and EE), progress has no significant effect as a moderator. Therefore, progress can be an independent predictor for behavioural intention.

Correlation analysis divided by gender showed that gender affects relations between constructs of the UTAUT model. For analysing the role of gender as a moderator more precisely, the moderation analysis was conducted to investigate effect on the relation between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention. Results are presented in table below (Table 9 and Table 10).

Table 9

The Role of Gender as a Moderator for Performance Expectancy in Predicting Behavioural Intention

Predictor	*b*	*SE*	*t*	*p*
PE	-.40	.34	-1.18	.26
Gender	-2.00	.42	-4.72	.00
PE × Gender	.88	.23	3.86	.00

Note: PE = performance expectancy.

PE has no significant effect on predicting BI. However, the interaction with gender as a moderator has significant effect on predicting BI (p = .001). Important to mention, that the effect of gender as a moderator of PE-BI relation is significant for men (p = .003) and strongly significant for women (p < .01), as shown in Table 11 and Figure 4.

Table 10

The Role of Gender as a Moderator for Effort Expectancy in Predicting Behavioural Intention

Predictor	*b*	*SE*	*t*	*p*
EE	1.37	.39	3.50	.00

Gender	-1.06	.38	-2.76	.01
EE × Gender	.16	.62	.80	.80

Note: EE = effort expectancy.

Effort expectancy has a significant effect on predicting behavioural intention (p =.003), however, the interaction of effort expectancy and gender was not significant for predicting BI.

Table 11

Conditional Effect of the Focal Predictor at Values of the Moderator:

Groups	*Effect*	*SE*	*t*	*p*
Males	.49	.14	3.44	.00
Females	1.37	.18	7.62	.00

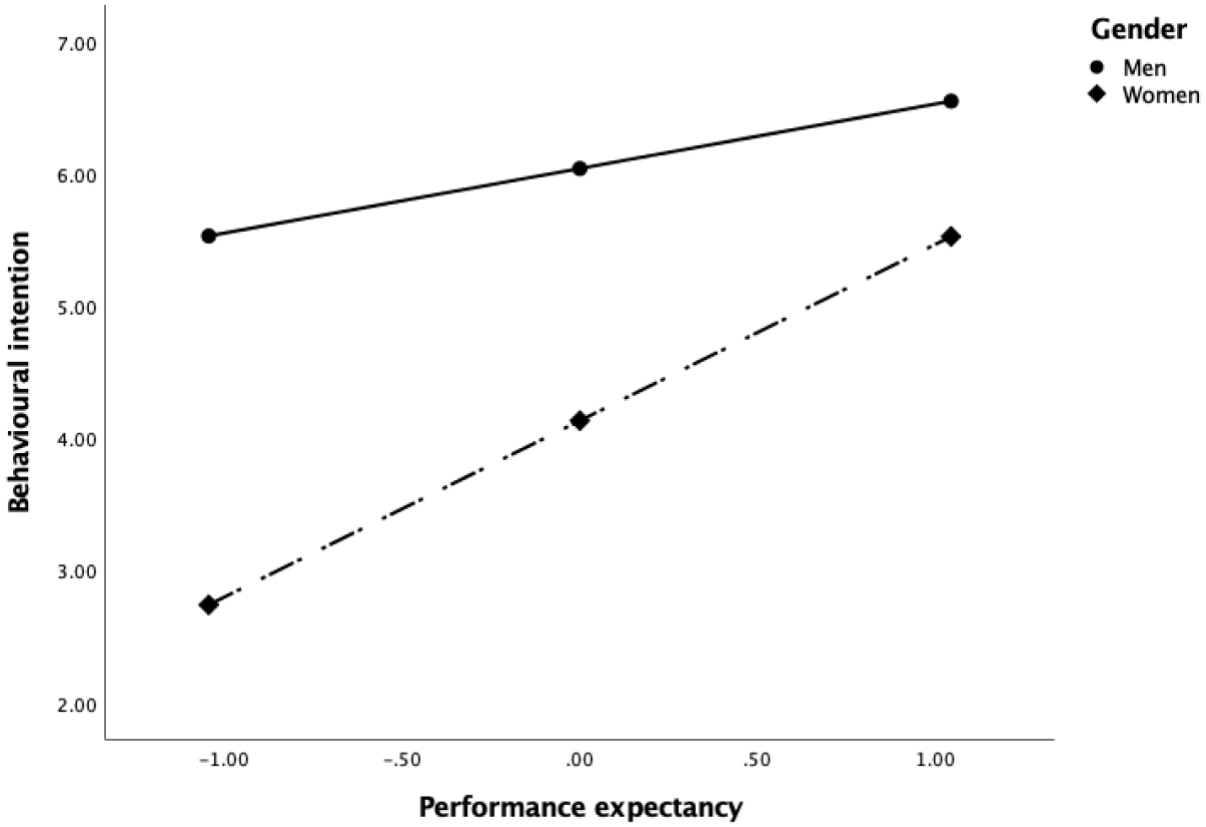

Figure 4

The Role of Gender as a Moderator on the PE-BI Relation.

The above-mentioned means that hypothesis 2 supported partially. Gender moderates the relation between performance expectancy and behavioural intention, but the moderation effect is no significant for the relation between effort expectancy and behavioural intention.

If progress does not moderate relations between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention, and if the direct effect of progress on behavioural intention can be assumed, then interesting to know whether gender is a moderator for relations between progress and behavioural intention. The moderation analysis was conducted to discover it.

Table 12

The Role of Gender as a Moderator for Progress in Predicting Behavioural Intention

Predictor	*b*	*SE*	*t*	*p*
Progress	.25	.70	.35	.73
Gender	-.85	.57	-1.50	.15
Progress × Gender	.21	.55	.39	.70

However, the interaction of progress and gender was not significant for predicting BI.

Discussion and conclusion

The current study aims to examine the relationship between progress in practising public speaking skills (PSS) and technology acceptance of the VR training among students from the Dutch university.

Findings

The present study offers insights into practising public speaking skills in the VR training for university students, specifically how their self-assessed progress affects their behavioural intention to use the virtual learning environment. First, the overall progress among all participants was positive. The study found that self-assessed progress in developing public speaking skills in virtual training is a significant determinant for behavioural intention to use this training. This suggests that the higher participants mark their progress, the more likely they will use the VR training for mastering public speaking skills. A positive significant correlation was found between progress and effort expectancy. That means that the higher progress, the easier to use the VR training for students from their perception. This suggests that the higher the progress in improving oral presentations, the higher the degree of perceived ease to use the VR application. However, the cause-effect of this relationship is not determined.

Second, other relationships between constructs of the UTAUT model, such as between effort expectancy and behavioural intention, were found positive and significant as expected. That suggests that the easier for participants to use the technology, the more likely they will adopt the technology. However, there was no significant correlation between other constructs of the UTAUT model. Performance expectancy was anticipated to correlate significantly with behavioural intention, but this correlation was not significant. Due consideration needs to be given to these findings, and explore these relations with a larger sample. Facilitating conditions and social influence did not correlate significantly with behavioural intention as expected.

Third, the linear regression analysis showed that the model included constructs, such as performance expectancy, effort expectancy, social influence and progress can predict about one third of the variance in behavioural intention, but the unique explained variance of the variables was quite low. Further, moderation analysis was conducted to understand the role of progress and gender as moderators on relationships between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention. Progress had no significant effect as a moderator neither on the relation between performance expectancy and behavioural

intention, nor on the relation between effort expectancy and behavioural intention. Gender had a significant effect as a moderator on the relation between performance expectancy and behavioural intention. However, gender was not moderate the relation between effort expectancy and behavioural intention. This means that the effect of performance expectancy on predicting behavioural intention is more significant for women, that was also supported by correlation analysis. The study included three research questions. Each research question is discussed in the following paragraphs.

Research question 1.

The first research question was "What is the relationship between students' progress in improving public speaking skills and students' technology acceptance of VR training for mastering these skills?". The hypothesis (H1) was "Progress will have a significant positive effect on students' technology acceptance of VR training for mastering PSS, and particularly on behavioural intention." Results showed that progress and behavioural intention were significantly and positively correlated, which supports H1. Progress in this study was calculated using self-assessment rubrics. Assumption was made that progress is very similar with the construct of results demonstrability (RD) that was defined as users' perception of the results of using the technology (Moore & Benbasat, 1991). Because of positive significant correlation between progress and behavioural intention, the conclusion can be made that the higher students evaluate their progress, the more likely they will use the VR learning environment to master PSS in the future. That can be explained that individuals' behaviours depend on their attitudes towards the results of their behaviour (Fishbein & Ajzen, 1975). Therefore, progress as the result of certain behaviour can be a predictor for behavioural intention to use a new technology.

Interestingly, that progress has a significant association with effort expectancy. Since the Pearson's correlation can identify only the strength of linear association between two variables, it is impossible to state which of the variables is a predictor and which one is the dependent variable. Thus, one can interpret this result as the higher the progress, the higher the degree of perceived ease to use the system for participants, and vice versa.

A linear regression analysis was conducted to understand how the research model included performance expectancy, effort expectancy, social influence and progress can help to predict behavioural intention. The model can predict about one third of the variance in behavioural intention. It is different from the original study of Venkatesh et al. (2003) where the UTAUT model could testify for 70 percent of the variance in behavioural intention to use the technology. However,

the results of the current study are similar with other the study of Pynoo et al. (2011), where they found that at the first time of collecting data using the UTAUT model can account only about one third of the variance. However, in their study the percentage of the variance was increasing throughout the time of measurement. Thus, can lead to the suggestion that one time of collecting data can be not enough to understand the whole picture of the relations between constructs of the UTAUT model and how the relations change.

Research question 2.

The second research question consisted of two sub-questions and two hypotheses consequently. The first sub-question (2a) was "How does progress moderate the relationships between performance expectancy and behavioural intention?". The hypothesis (H2a) for this question was "Progress will moderate the relations between performance expectancy and behavioural intention, such that the effect will be stronger for student with the higher progress". The second sub-question (2b) was "How does progress moderate the relationships between effort expectancy and behavioural intention?" with the hypothesis (2b) "Progress will moderate the relations between effort expectancy and behavioural intention, such that the effect will be stronger for student with the higher progress."

However, results show that progress was not a significant moderator for both relations. This does not support both hypotheses. That can lead to the conclusion that does not matter how high or low users evaluate their progress while using the technology, it will not affect the relationship between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention. The possible explanation of these results can be that even though progress was based on the concept of results demonstrability from Moore and Benbasat (1991) theory, they were not identical. Moore and Benbasat (1991) distinguish between characteristics of a technology (that do not depend on users' perception) and users' perception of these attributes. An adopters' perception of the new system affects its acceptance and future use (Moore & Benbasat, 1991). The adopters' behaviour can be predicted by how they perceive certain attributes of a technology (Moore & Benbasat, 1991). However, progress was not the attribute of the technology itself: it was a user's self-assessed results in improving performance. Therefore, the assumption that the perception of the progress will affect the relations between perception of other attributes and intention to use this technology appeared to be wrong.

Other explanation can be of the way how data was gathered. Moore & Benbasat (1991) used results demonstrability as a users' perception of the results of using the technology. Thus, these authors measured this construct not by asking participants to evaluate their progress using the self-assessment questionnaire (like in the present study), but by asking participants about perception of the results. Thus, in the current study students assessed their own performance, while the results demonstrability construct supposed to assess the perception of the technology. Performance expectancy and effort expectancy also assessed users' perception of the technology. Thus, users self-assessed results cannot moderate relations between performance expectancy and behavioural intention, and between effort expectancy and behavioural intention.

Research question 3.

The third research question consisted of two sub-questions and two hypotheses consequently. The first sub-question (3a) was "How does gender moderate the relationships between performance expectancy and behavioural intention?", where the hypothesis (3a) was "Relations between performance expectancy and behavioural intention will be moderated by gender, particularly the effect will be stronger for men." The second sub-question (3b) was formulated as "How does gender moderate the relationships between effort expectancy and behavioural intention?". The hypothesis for this question (3b) was "Relations between effort expectancy and behavioural intention will be moderated by gender, particularly the effect will be stronger for women".

Venkatesh et al. (2003) found that performance expectancy has a highly significant direct effect on behavioural intention in both voluntary and mandatory settings, while in the present study the effect was not significant. Important to note, that Venkatesh et al. (2003) conducted their study in the work context, when the current study was conducted in the educational context. The difference is that performance expectancy construct was created for the work context and included questions, such as accomplish tasks quickly, increase productivity. While in the educational context, the focus is not only on achieving goals and getting results, but also on the process of learning. Moreover, learning goals and results can require more time for being visible for learners. Additionally, Venkatesh, Thong and Xu (2016) argue that a user should first use a technology to be able to achieve outcomes, such as improvement in performance. Thus, one can assume that one time of using the technology is not enough for adopters to make a clear view of how using a new technology will help to improve performance. Therefore, one time of data collection is not enough

to understand the role of performance expectancy on behavioural intention to use a new technology. Other studies also did not find significant correlation between performance expectancy and behavioural intention. For example, Hussin, Jaafar and Downe (2011) conducted the study in the educational work context: they investigated the acceptance of the VR technology among school teachers. They also did not find a significant correlation between performance expectancy and behavioural intention. However, their participants did not use the technology before the study. Therefore, Hussin et al. (2011) assumed that teachers cannot imagine the usefulness of applying the new technology and thus performance expectancy appeared to have no significant effect in predicting behavioural intention. Another study of Kurt and Tingöy (2017) conducted among students of two universities in the United Kingdom and Turkey showed a significant correlation between performance expectancy and behavioural intention in both countries. However, according to the article, the virtual environment is widely used in both universities for some time. Therefore, students could see the value of using for the virtual environment in real life. That makes questionable using the UTAUT model in this case because the main goal of the model is predicting the acceptance rather than explaining and showing that acceptance has happened (or not). However, in the present study participants used the VR only during the experiment but not in every-day classroom routine. Thus, it can be assumed that they may not fully see the value of using the VR application, like in the study of Hussin et al. (2011). Other assumption can be that performance expectancy can be moderated by experience, however, this moderator was not included in the research model of the current study.

Venkatesh et al. (2003) findings show that performance expectancy is moderated by gender and age, in other words, the effect is stronger for younger men. Therefore, it was assumed that in the current study performance expectancy is not significant towards behavioural intention due to sample composition: six males and thirteen females. Nevertheless, in the current study performance expectancy has a high significant correlation with behavioural intention for female students, but not for male students. Moderation analysis also showed that gender has significant effect on relation between performance expectancy and behavioural intention. Particularly, that the effect is stronger for women, rather than for men. The difference in predicting behavioural intention by performance expectancy between female and male students can be explained by the difference in their study culture. Study culture includes different concepts such as attitude toward school, study behaviour and academic achievements (Houtte, 2004). For example, some studies discovered that boys have less motivation to study than girls, and that boys have fewer positive attitudes toward school (Houtte, 2004). Also, girls tend to spend more time on doing homework,

they are more diligent in performing study tasks, while boys need more motivation and stimulation, and they more prone to risky behaviour (Houtte, 2004). Academic performance is influenced by the study culture (Houtte, 2004). Boys' culture is less study-oriented than the study culture of girls (Houtte, 2004). Thus, it may be possible that study performance is more important to women and therefore, they more likely to adopt the new technology to achieve better study performance.

Correlations between other constructs of the UTAUT model were diverse. A significant correlation was found only between effort expectancy and behavioural intention, as expected. This means the easier participants find to use the system, the more likely they will adopt the system. It was expected, that gender would affect the relation between effort expectancy and behavioural intention. However, results did not prove it. In other words, gender does not moderate the relation between effort expectancy and behavioural intention. That is different from the original study of Venkatesh et al. (2003), where the effect was stronger for younger women on early stages of experience. However, the effect of gender can be different in the educational context. First of all, because of study culture that was discussed above. Second of all, the nature of tasks and way of getting results are also different, as mentioned. Thus, the conclusion is that effort expectancy is strong determinant for behavioural intention in educational context, regardless the gender.

The other construct of the UTAUT model is social influence that has no significant effect on behavioural intention, as expected. Venkatesh et al. (2003) found that social influence is not a significant predictor for behavioural intention in voluntarily settings, but it becomes significant in mandatory settings. All participants took part in the current study voluntarily, therefore social influence was not expected to have a strong direct effect on behavioural intention. Also, participants could not communicate between each other about their experience of using the VR training before the experiment, thus they could not affect each other perception of using the technology.

Limitations

It is essential to mention that this study has some limitations. The **first** limitation of this study was the sample size and the data collected. Involving more participants in the study may increase reliability one of the constructs (facilitated conditions) and lead to achieving statistical significance of some of the results. Particularly, the correlation between performance expectancy and behavioural intention was not significant.

Second, during the current study data was gathered only once, while Venkatesh et al. (2003) studied UTAUT carrying a longitudinal study with three times of measurement the constructs. Conducting the experiment second and third time may help participants to see the advantages of using the VR training for mastering PSS, and therefore it can change the results, for example, increase the role of the performance expectancy construct in predicting behavioural intention. Also, more data can be gathered, especially, data about the actual use of the VR training can be obtained. In the original study, facilitated conditions had no direct effect on behavioural intention, but FC interacted with actual use (Venkatesh et al., 2003). Therefore, data about actual use would allow the validation of the facilitating conditions.

Third, the construct of results demonstrability (RD) was included in the research like the progress according to self-assessment scores. While in the original source Moore and Benbasat (1991) measured it with a questionnaire, similarly with the way to measure items in the UTAUT model. These different approaches to measure RD could affect the data collected and results.

Fourth, students participated in the experiment individually. However, sometimes they came in groups of two, three or even four people. It helped to save some time for participants and for a researcher, it could also violate the assumption of independence. It can occur while examining the behaviour of students working in small groups (Pallant, 2005). Even though they presented still individually, with only one person in the room where the experiment took place, they still could share their opinion about using the VR training in a halfway when they were waiting before second and third presentation performance.

Conclusion

This study aimed to contribute to the knowledge about technology acceptance of using the VR technology among university students. The topic of technology acceptance is of a plethora of research. Similarly, the VR technology received enough attention from scholars. Nevertheless, studies about the acceptance of the VR technology are still limited. Moreover, studying technology acceptance using the UTAUT framework is more popular in the working context, for which it was invented, rather than in the educational context. Thus, the present study contributed to current knowledge about adopting the VR technology for educational purposes using the UTAUT model.

The results of the current study are partly different from the original study of Venkatesh et al. (2003) that gives an opportunity for discussion. Particularly, the present study discovered that performance expectancy had no significant association with behavioural intention, in contrast with the study of Venkatesh et al. (2003). In other study Venkatesh et al. (2016) concluded that to see

the results of using a new system, users need time, that idea is also supported by other research (for example, Hussin et al., 2011). That can lead to assumption that even though experience did not moderate the relations between performance expectancy and behavioural intention in the study of Venkatesh et al. (2003), it still can be a moderator for this relation. However, experience was not included in the scope of the current study due to time limitations. Also, the performance expectancy construct requires some adaptation for studying technology acceptance in the educational context. This construct was created for the work context. However, questions that can be relevant for the work context can be not relevant for the educational context. For example, performance expectance included statements as “achieving tasks more quickly”. However, in the educational context tasks usually do not need to be achieved more quickly rather than with better quality. Thus, items for measuring the performance expectancy construct in the educational context need to be reformulated and adapted. The results of the current study discovered the moderation effect of gender as in the study of Venkatesh et al. (2003), however, the effect is different. Venkatesh et al. (2003) used the assumption that men in general are more task-oriented, therefore, performance expectancy would be more crucial for man. However, this assumption can work in the working context, but cannot work in the educational context, where men can be less studious than women (Houtte, 2004).

The research model in the current study included not only the UTAUT model, but also the new construct. This construct is progress in practising public speaking skills based on self-assessment scores. Progress in practising complex skills such as public speaking skills, using the new technology appeared to be a significant determinant for predicting intention to use the technology. Previous studies in technology acceptance measured mostly users’ perceptions of the features of the technology (Venkatesh et al., 2003; Venkatesh et al., 2016). The progress variable in the current study even though was based on self-assessment scores, did not present the perception of the features of the technology, but the user’s results of using the technology. Thus, not only perception of the features of the technology can be helpful in understanding and predicting user’s behaviour in adoption a new technology, but also something else that can affect the attitude towards using the new technology, as progress. In the review of the extensions of the UTAUT model Venkatesh et al. (2016) discovered that some new exogenous mechanisms can affect the main constructs of the UTAUT model, but also there can be new endogenous mechanisms that can have direct effect on the behavioural intention or usage behaviour. Progress can be one of these constructs that either has direct effect on performance expectancy, effort expectancy, either on behavioural intention or actual use.

Future Research

The limitations of this study lead to suggestions for future research. First, to investigate the relationships between progress and all constructs of the UTAUT model for acceptance of the VR training for practising complex skills, such as giving oral presentations, more time can be considered. It can help not only to find more participants and increase the sample size but also will allow to conduct a longitudinal study with multiple time of data collection. It can help to examine more carefully relationship between progress and behavioural intention, inclusive involving gender as a moderator. It also can help to understand the relationship between performance expectancy and behavioural intention, and understand the role of experience as a moderator for these relations.

The bigger sample can increase the significance of some relationships (for example, performance expectancy and behavioural intention), and increase the reliability of some scales (for example, facilitating conditions). Additionally, more time allows to measure the actual use of the VR application, and thus to use the facilitating conditions for predicting the use, as it was in the original study of Venkatesh et al. (2003). Second, results demonstrability can be measured not only by measuring the progress using the self-assessment questionnaire but also including questions about this construct in the questionnaire itself similarly with other UTAUT constructs. It can help to understand whether progress and results demonstrability truly connected from the users' perception and decide whether the results demonstrability construct needs to be included in the UTAUT model for the educational context. Third, the correlation between performance expectancy and behavioural intention was unexpectedly insignificant. It leads to the assumption that this relationship can vary depending on the context. Thus, more investigation is needed in the study context to discover the nature of this correlation. Particularly, how performance expectancy can predict behavioural intention to use new technology for learning purposes and which roles play moderators. As was shown in the present study, performance expectancy has a stronger effect for females than for males, that is different from what Venkatesh and colleagues (2003) found in their study. Therefore, future research can pay closer attention to a correlation between performance expectancy and behavioural intention moderated by gender in the study context.

In the limitation it part was mentioned that the way of collecting the data about the progress was different from collecting the data about other constructs. Thus, it would be interesting to include the construct of result demonstrability in the model and gather the data using the

questionnaire and compare whether the constructs of results demonstrability and progress are overlapping and how both of them affect the behavioural intention and future use of a technology. Discovering the effect of factual progress and perception of the results on intention and actual use of the technology can help to better understand and predict technology acceptance in the educational context. Particularly, what is the effect of progress on performance expectancy and effort expectancy, and on behavioural intention and usage of the technology.

Additionally, the insights in acceptance of the VR technology can be not only helpful for the future students, but also fascinating as using VR itself.

References

Živković, S. (2014). The Importance Of Oral Presentations For University Students. *Mediterranean Journal of Social Sciences*.

Agarwal, N., Thawani, R., Gupta, S., Sharma, A., & Dhaliwal, U. (2015). Objective, structured proforma to score the merit of scientific presentations. *Indian Journal of Surgery, 77*(S3), 1001-1004.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Alshare, K., & Hindi, N. M. (2004). The importance of presentation skills in the classroom: Students and instructors perspectives. *Journal of Computing Sciences in Colleges, 19*(4), 6–15.

Alwi, N. F., & Sidhu, G. K. (2013). Oral presentation: Self-perceived competence and actual performance among UiTM business faculty students. *Procedia-Social and Behavioral Sciences, 90*, 98-106.

Ananiadou, K., & Claro, V. (2009). 21st century skills and competences for new millennium learners in OECD countriesdoi:10.1787/218525261154. *OECD Education Working Papers*, 1-33.

Babbie, E. (2010). *The practice of social research.* Belmont, CA: Wadsworth.

Batrinca, L., Stratou, G., Shapiro, A., Morency, L.-P., & Scherer, S. (2013). Cicero - towards a multimodal virtual audience platform for public speaking training. In Proceedings of intelligent virtual agents (IVA). *Springer*, 116-128.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7-74.

Calcich, S., & Weilbaker, D. (1992). Selecting the optimum number of in-class sales presentations. *Marketing Education Review, 2*, 31-33.

Campbell, B., Collins, P., Hadaway, H., Hedley, N., & Stoermer, M. (2002). Web3D in ocean science learning environments. *Proceeding of the Seventh International Conference on 3D Web Technology* (pp. 85-91). Tempe, Arizona, USA: ACM.

Campbell, K. S., Mothersbaugh, D. L., Brammer, C., & Taylor, T. (2001). Peer versus self-assessment of oral business presentation performance. *Business Communication Quarterly, 64*(3), 23–40.

Chang, X., Zhang, D., & Jin, X. (2016). Application of virtual reality technology in distance learning. *International Journal of Emerging Technologies in Learning (iJET), 11*(11), 76-79.

Chollet, M., Wörtwein, T., Morency, L.-P., Shapiro, A., & Scherer, S. (2015, September). Exploring feedback strategies to improve public speaking. In K. Mase, M. Langheinrich, D. Gatica-Perez, H. Gellersen, T. Choudhury, & K. Yatani. *The 2015 ACM International Joint Conference* (pp. 1143–1154). Osaka, Japan: ACM.

Clark, R. E., & Feldon, D. F. (2014). Ten common but questionable principles of multimedia learning. In R. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (pp. 151-173). Cambridge: Cambridge University Press.

Clyne, M. P., & Raftery, S. E. (2008). Feedback: An essential element of student learning in clinical practice. *Nurse Education in Practice, 8*(6), 405-411.

Cohen, J. W. (1988). *Statistical power analysis for the behavioral sciences (2nd edn).* Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education 6th ed.* London: Routledge.

Collins, J. (2004). Education techniques for lifelong learning. *RadioGraphics, 24*(4), 1185-1192.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98-104.

Cruz-Neira, C., Fernández, M., & Portalés, C. (2018). Virtual reality and games. *Multimodal Technologies and Interaction, 1*(8), 1-5.

Dalgarno, B., & Lee, M. J. (2010). What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology, 40*(6), 10-32.

Davis, F. D. (1993). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies, 38*(3), 475-487.

De Grez, L. (2009). *Optimizing the instructional environment to learn presentation skills.* (Unpublished doctoral dissertation). Ghent: Ghent University.

De Grez, L., Valcke, M., & Berings, D. (2010). Peer assessment of oral presentation skills. *Procedia, Social and Behavioral Sciences, 2*(2), 1776–1780.

De Grez, L., Valcke, M., & Roozen, I. (2012). How effective are self- and peer assessment of oral presentation skills compared with teachers' assessments? *Active Learning in Higher Education, 13*(2), 129-142.

Fachikov, N., & Boud, D. (1989). Student self-assessment in higher education: A meta-analysis. *Review of Educational Research, 59*(4), 395-430.

Falchikov, N. (2005). *Improving assessment through student involvement. Practical solutions for aiding learning in higher and further education.* New York: RoutledgeFalmer.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitudes, intention, and behavior. An introduction to theory and research.* Massachussets: Addison-Wesley.

Fluckiger, J., Tixier y Vigil, Y., Pasco, R., & Danielson, K. (2010). Formative feedback: Involving students as partners in assessment to enhance learning. *College Teaching, 58*(4), 136-140.

Gros, B., & García-Peñalvo, F. J. (2016). Future trends in the design strategies and technological affordances of e-learning. In M. Spector, B. B. Lockee, & M. D. Childress, *Learning, Design, and Technology. An International Compendium of Theory, Research, Practice, and Policy* (pp. 1-23). Switzerland: Springer International Publishing.

Hahn, L. D. (2004). Primary stress and intelligibility: Research to motivate the teaching of suprasegmentals. *TESOL Quarterly, 38*(2), 201-223.

Hattie, J. A. (1999, August). *Influences on student learning.* Retrieved from Inaugural professorial address, University of Auckland, New Zealand: https://cdn.auckland.ac.nz/assets/education/about/research/documents/influences-on-student-learning.pdf

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York: Guilford Press.

Hincks, R. (2005). Measures and perceptions of liveliness in student oral presentation speech: A proposal for an automatic feedback mechanism. *33*(4), 575-591.

Hincks, R., & Edlund, J. (2009). Promoting increased pitch variation in oral presentations with transient visual feedback. *Language Learning & Technology, 13*(3), 32–50.

Houtte, M. V. (2004). Why boys achieve less at school than girls: the difference between boys' and girls' academic culture. *Educational Studies, 30*(2), 159-173.

Hussin, N., Jaafar, J., & Downe, A. (2011). Assessing educators' acceptance of Virtual Reality (VR) in the classroom using the Unified Theory of Acceptance and Use of Technology (UTAUT). In B. Z. al. (Ed.), *Visual Informatics: Sustaining Research and Innovations. IVIC 2011. Lecture Notes in Computer Science. 7066*, pp. 216-225. Berlin: Springer.

Kothgassner, O., Felnhofer, A., Beutl, L., Hlavacs, H., Lehenbauer-Baum, M., & Stetina, B. (2012). A virtual training tool for giving talks. *Lecture Notes in Computer Science Entertainment Computing - ICEC 2012*, 53-66.

Kozac, J., Hancock, P., Arthur, E., & Chrysler, S. (1993). Transfer of training from virtual reality. *Ergonomics, 36*(7), 777-784.

Kurt, Ö. E., & Tingöy, Ö. (2017). The acceptance and use of a virtual learning environment in higher education: An empirical study in Turkey, and the UK. *International Journal of Educational Technology in Higher Education, 14*(1), 1-15.

Lammfromm, R., & Gopher, D. (2011). Transfer of skill from a virtual reality trainer to real juggling. *BIO Web of Conferences* (pp. 1-4). EDP Sciences.

Lee, J. M., Ku, J., Jang, D. P., Kim, D. H., Choi, Y. H., & Kim, I. Y. (2002). Virtual reality system for treatment of the fear of public speaking using image-based rendering and moving pictures. *CyberPsychology & Behavior, 5*(3), 191–195.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 22*(140), 1–55.

Lucas, S. (2012). *The art of public speaking .* London: McGraw Hill.

Mayer, R. (Ed.). (2014). *The Cambridge Handbook of Multimedia Learning (Cambridge Handbooks in Psychology).* Cambridge: Cambridge University Press.

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research, 2*(3), 192-222.

Nazligul, M., Yilmaz, M., Gulec, U., Gozcu, M., O'Connor, R., & Clarke, P. (2017). Overcoming public speaking anxiety of software engineers using virtual reality exposure therapy. In J. Stolfa, S. Stolfa, R. O'Connor, & R. Messnarz, *Systems, Software and Services Process Improvement. EuroSPI 2017. Communications in Computer and Information Science* (Vol. 748, pp. 191-202). Cham: Springer.

Neguţ, A., Matu, S., Sava, F. A., & David, D. (2016). Task difficulty of virtual reality-based assessment tools compared to classical paper-and-pencil or computerized measures: A meta-analytic approach. *Computers in Human Behavior, 54*, 414-424.

Neil, E., Worrall, L., Day, A., & Hickson, L. (2003). Voice and speech characteristics and vocal hygiene in novice and professional broadcast journalists. *Advances in Speech Language Pathology, 5*(1), 1-14.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31*(2), 199-218.

Nicol, D., & Milligan, C. (2006). Rethinking technology-supported assessment practices in relation to the seven principles of good feedback practice. In C. Bryan, & K. Clegg, *Innovative assessment in higher education.* London: Taylor and Francis Group Ltd.

Noesgaard, S. S., & Ørngreen, R. (2015). The effectiveness of e-learning: An explorative and integrative review of the Definitions, methodologies and factors that promote e-learning effectiveness. *The Electronic Journal of e-Learning, 13*(4), 278-290.

Pallant, J. F. (2005). *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows (Versions 12).* Crows Nest, N.S.W.: Allen & Unwin.

Pantelidis, V. S. (2009). Reasons to Use Virtual Reality in Education and Training Courses and a Model to Determine When to Use Virtual Reality. *Themes in Science and Technology Education, 2*, 59-70.

Parsons, T. D., & Rizzo, A. A. (2008). Affective outcomes of virtual reality exposure therapy for anxiety and specific phobias: a meta-analysis. *Journal of Behavior Therapy and Experimental Psychiatry, 39*(3), 250–261.

Poeschl, S. (2017). Virtual Reality Training for Public Speaking—A QUEST-VR Framework Validation. *Frontiers in ICT*(4).

Pynoo, B., Devolder, P., Tondeur, J., Braak, J. V., Duyck, W., & Duyck, P. (2011). Predicting secondary school teachers' acceptance and use of a digital learning environment: A cross-sectional study. *Computers in Human Behavior, 27*(1), 568–575.

Rose, F. D., Attree, E. A., Brooks, B. M., Parslow, D. M., Penn, P. R., & Ambihaipahan, N. (2000). Training in virtual environments: Transfer to real world tasks and equivalence to real task training. *Ergonomics, 43*(4), 494-511.

Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science, 18*, 119–144.

Seattle Learning Academy. (2016). *Introduction to pitch*. Retrieved from https://pronuncian.com/pitch-lessons/

Slater, M. (2003). A note on presence terminology. *Presence Connect, 3*, 1-5.

Slater, M., & Wilbur, S. (1997). A Framework for Immersive Virtual Environments (FIVE): Speculations on the role of presence in virtual environments. *Presence: Teleoperators and Virtual Environments, 6*(6), 603-616.

Stefani, L. A. (1994). Peer, self and tutor assessment: Relative reliabilities. *Studies in Higher Education, 19*(1), 69-75.

Stevens, J. (1996). *Applied multivariate statistics for the social sciences (3rd edn).* Mahway, NJ: Lawrence Erlbaum.

Strangert, E. &. (2008, September). What makes a good speaker? Subject ratings, acoustic measurements and perceptual evaluations. *9th Annual Conference of the International Speech Communication Association* (pp. 1688-1691). Brisbane, Australia: INTERSPEECH.

Tsang, A. (2017). Enhancing learners' awareness of oral presentation (delivery) skills in the context of self-regulated learning. *Active Learning in Higher Education*, 1-12.

Tsang, A. (2018). Positive effects of a programme on oral presentation skills: High- and low-proficient learners' self-evaluations and perspectives. *Assessment & Evaluation in Higher Education, 43*(5), 760-771.

Van Ginkel, S., Gulikers, J., Biemans, H., & Mulder, M. (2015). Towards a set of design principles for developing oral presentation competence: A synthesis of research in higher education. *Educational Research Review, 14*, 62-80.

Van Ginkel, S., Gulikers, J., Biemans, H., & Mulder, M. (2017). The impact of the feedback source on developing oral presentation competence. *Studies in Higher Education, 42*(9), 1671-1685.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*(3), 425-478.

Venkatesh, V., Thong, Y. L., & Xu, X. (2016). Unified Theory of Acceptance and Use of Technology: A synthesis and the road ahead. *Journal of the Association for Information Systems, 17*(5), 328 – 376.

Vichitvejpaisal, P., Yamee, N., & Marsertsri, P. (2016). Firefighting simulation on virtual reality platform. *2016 13th International Joint Conference on Computer Science and Software Engineering (JCSSE)*.

Wallach, H. S., Safir, M. P., & Bar-Zvi, M. (2009). Virtual reality cognitive behavior therapy for public speaking anxiety. *Behavior Modification, 33*(3), 314-338.

Wallach, H. S., Safir, M. P., & Bar-Zvi, M. (2009). Virtual Reality Cognitive Behavior Therapy for Public Speaking Anxiety. *Behavior Modification, 33*(3), 314-338.

Wiliam, D., & Black, P. (1996). Meanings and Consequences: A Basis for Distinguishing Formative and Summative Functions of Assessment? *British Educational Research Journal, 22*(5), 537–548.

Zhang, J., Chang, J., Yang, X., & Zhang, J. (2017). In J. Chang, J. Zhang, N. Magnenat Thalmann, S. Hu, R. Tong, & W. W., *Next Generation Computer Animation Techniques. AniNex 2017. Lecture Notes in Computer Science* (Vol. 10582). Cham: Springer.

Živković, S. (2014). The importance of oral presentations for university students. *Mediterranean Journal of Social Sciences*.

Appendices

Appendix 1. The questionnaire

Hello, you'll see the self-assessment rubric with 3 questions. The first questionnaire is training one. Read the questions, answer, press "next" and then we will start the experiment. You can listen to your voice recording while answering the questions.

Q1. Variation of pitch (intonation)

I used pitch variation (changing the intonation) during the presentation all the time

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

When I used pitch variation it matched the content all the time

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Q2. Pauses

Pauses were used in an appropriate place in the speech all the time

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Pauses matched the content all the time during the speech

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Q3. What are strengths and weaknesses of your vocal features? What do you want to change or improve? (1-2 sentences)

2. You have finished the questionnaire, so you know how to do it for this experiment. Now, please, give the presentation.

Note: The same questions repeated two times (Q4-Q9).

4. You have finished the questionnaire. Now we ask you to share your experience about using this VR training.

Q10. Tell us about your experience of using this VR application

Performance expectancy:

I find this VR training useful for my study/future job

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Using the VR training enables me to accomplish tasks more quickly

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Using this VR training increases my productivity

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Using the VR training increases my chances of achieving things that are important to me

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Effort expectancy:

My interaction with the VR app is clear and understandable

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

I find the VR app easy to use

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Learning how to use the VR app is easy for me

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

It is easy for me to become skilful at using the VR app

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Facilitating conditions:

I have the resources necessary to the VR training

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

I have the knowledge necessary to use the VR training

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

The VR training is compatible with other technologies I use

Strongly agree						Strongly disagree
○	○	○	○	○	○	○

Social influence:

I can get help from others when I have difficulties using the VR training

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

People who are important to me think that I should use the VR training

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

People who influence my behaviour think that I should use the VR training

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

People whose opinions I value prefer that I use the VR training

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

Behavioural intention:

I intend to continue using the VR training in the future (during my study)

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

I plan to continue to use the VR training frequently

Strongly agree ○ ○ ○ ○ ○ ○ ○ Strongly disagree

Appendix 2. Descriptive statistics

Table 13

Descriptive Statistics for each Item of the Performance Expectancy (PE) Construct

	N	*Min*	*Max*	*M*	*SD*
PE1	19	4	7	5.74	1.05
PE2	19	2	7	5.11	1.41
PE3	19	2	7	5.11	1.49
PE4	19	3	7	5.26	1.15
PE	19	4	7	5.30	1.04

Note: PE1-PE4 = different questions for measure the performance expectancy (PE) variable. PE = computed variable for the performance expectancy construct.

Table 14

Descriptive Statistics for each Item in the Effort Expectancy (EE) Construct

	N	*Min*	*Max*	*M*	*SD*
EE1	19	4	7	5.95	.97
EE2	19	5	7	6.05	.70
EE3	19	5	7	6.11	.81
EE4	19	5	7	6.26	.73
EE	19	5	7	6.09	.62

Note: EE1-EE4 = different questions for measure effort expectancy (EE) variable. EE = computed variable for the effort expectancy construct.

Table 15

Descriptive Statistics for each Item in the Facilitation Conditions (FC) Construct

	N	*Min*	*Max*	*M*	*SD*
FC1	19	1	7	5.53	1.35
FC2	19	4	7	5.79	0.79
FC3	19	1	7	5.05	1.65
FC	19	4	7	5.46	.69

Note: FC1-FC3 = different questions for measure facilitating conditions (FC) variable. FC = computed variable for the facilitating conditions construct.

Table 16

Descriptive statistics for each item in the Social influence (SI) Construct

	N	*Min*	*Max*	*M*	*SD*
SI1	19	4	7	5.63	1.01
SI2	19	1	7	3.74	1.63
SI3	19	1	6	3.58	1.47
SI4	19	1	6	3.61	1.54

SI	19	2	6	4.14	1.18

Note: SI1-SI4 = different questions for measure social influence (SI) variable. SI = computed variable for the social influence.

Table 17

Descriptive Statistics for each Item in the Behavioural Intention (BI) Construct

	N	*Min*	*Max*	*M*	*SD*
BI1	19	2	7	5.16	1.58
BI2	19	2	7	4.63	1.80
BI	19	2	7	4.89	1.50

Note: BI1-BI2 = different questions for behavioural intention (BI) variable. BI = computed variable for behavioural intention.

Appendix 3. Correlational matrix with an outlier