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Enhancing undergraduate cybersecurity student communication skills through Immersive AR/VR and AI-Driven simulations using VirtualSpeech

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Abstract

Students enrolled in Science Technology, Engineering and Math (STEM) degree programs follow a curriculum that emphasizes developing technical proficiency in a variety of areas. Opportunities for students to participate in public speaking settings may not happen often enough within their coursework for them to feel entirely comfortable when placed in those situations. An emerging field of research involves investigating the use of immersive artificial intelligence (AI) technologies to measure its effect on a student's public speaking skills. Our pilot study provided students with the opportunity to interact with AR/VR headsets configured with VirtualSpeech software. The students completed a cybersecurity-based communication exercise with virtual avatars in the headset that presented dynamic real-world scenarios for student interaction. To assess communication competence, the researchers used an adapted version of the previously validated Self-Perceived Communication Competence (SPCC) scale from the Intrinsic Motivation Inventory (IMI) survey tool. The self-report survey covers four communication contexts: public, meeting, group, and dyad. Students rate their competence in each scenario using a 5-point Likert-scale. The goal was to see if immersive technology can influence how confident students feel in a professional setting. This pilot study demonstrated that immersive simulation is a both a viable and promising intervention for improving public speaking confidence in higher education settings. Further, the technology and simulation suggest effectiveness in enhancing perceived communication competence, supporting experiential learning through realistic practice, increasing intrinsic motivation and enjoyment, benefiting first-generation students in professional communication scenarios when compared to non-first-generation students.

Keywords: AR/VR education, cybersecurity education, communication skills, AI-driven feedback, immersive learning

Introduction

Students enrolled in Science Technology, Engineering and Math (STEM) degree programs follow a curriculum that emphasizes developing technical proficiency in a variety of areas. Opportunities for students to participate in public speaking settings may not happen often enough within their coursework for them to feel entirely comfortable when placed in those situations. Students practice public speaking skills classrooms where they present in front of peers, some who may already have established personal relationships with each other. Speaking to a familiar audience may be helpful in reducing anxieties the presenter may feel; however, it may not replicate the experience one gets when the speaker is presenting to

an audience with whom they have no prior connection. Presenting to classmates is quite different from presenting to a Chief Information Security Officer (CISO) or an industry professional. Augmented Reality/Virtual Reality (AR/VR) applications like VirtualSpeech create immersive environments where students can develop speaking skills in simulated real-world situations. The platform uses AI-driven avatars that ask questions and respond to how a real executive might. This study explores whether using this kind of technology improves communication confidence and reduces anxiety.

Many students have strong technical skills but struggle with confidence in their communication skills. Public speaking anxiety can impact performance, even when students understand the material. Traditional classroom presentations may not fully prepare students for real world scenarios and may cost them job opportunities. Although AR/VR technology is becoming more popular in education, there is still limited research on how effective it is specifically for improving communication confidence. Our research will contribute to the growing body of knowledge that is investigating how immersive AI technologies such as augmented reality and virtual reality can be used in conjunction with the student's preparation and delivery of information in a public setting. We will continue to synthesize the outcomes to assess whether the integration of the AR/VR technologies shows any measurable improvement in the way the student feels about their ability to speak confidently about their assigned subject in a public setting.

Background and Literature Review

Research shows that virtual reality (VR) is becoming a useful tool in education, especially for learning skills that require practice, like communication and presentations. Instead of only reading or listening, students can practice in realistic virtual environments. Radianti et al. (2020) and Cinar et al. (2024) found that VR helps students learn better and that adding AI feedback makes it even more effective.

Radianti et al. (2020) conducted a systematic review of VR use in higher education. They found that VR often increases student engagement and helps with hands-on skill development compared to normal classroom teaching. VR works well for practice-based learning because students can actively perform tasks instead of just learning about them. This is important for communication skills, since speaking and presenting get better with practice. However, the authors also found many VR studies do not measure results very well or track long-term improvement, indicating the need for more structured research.

Similarly, Conrad (2024) conducted a systematic review of the literature on what they term immersive VR. Their findings indicated the technology can offer advantages over the use of other media, especially when the learner plays a more active role. These findings have practical implications for teaching and learning practice when designing appropriate instructional interventions using this technology.

Cinar et al. (2024) evaluated an application of VR learning systems that include AI-powered feedback and compared them to a cohort who were taught with more traditional teaching methods. Their study showed that students learned more when VR included AI feedback. The AI gave both a gamified experience and provided personalized responses and corrections, which helped students fix mistakes faster and improve performance. Their findings suggest that VR by itself is helpful, but VR with smart feedback built-in is even better for learning. Further, while VR is already a technology that conveys educational content on its own, adding AI to it will offer a more effective solution.

Bachmann et al. (2023) found that VR public speaking training improves both performance and acceptance of the technology. Their results showed that students not only improved their speaking abilities but also felt more comfortable using VR. While their results were promising, Bachmann et al. (2023) indicated the need

for further study about what brought about the effect. Similarly, KroczeK and Mühlberger (2023) found that practicing public speaking in a virtual environment with a supportive audience improved confidence and real-world speaking performance, suggesting that skills learned in VR can effectively transfer to real life situations.

Di Palma et al. (2025) found that the effectiveness of VR training depends heavily on the level of feedback. When students feel immersed and receive meaningful feedback, their learning outcomes improve. This idea is supported by Huang and Hwang (2026), who found that AI VR systems can reduce both public speaking anxiety and interview anxiety. Their study highlights that personalized AI feedback helps students identify mistakes and improve faster than traditional methods.

Collectively, these theoretical perspectives suggest that immersive AI technologies have shown the potential to enhance public speaking development through a variety of approaches including experiential engagement, confidence building, optimized cognitive processing, structured feedback-driven repetition, and systematic anxiety reduction. This integrated framework supports examining both performance outcomes and changes in self-efficacy and communication confidence over time.

Our research explores the effectiveness of immersive AR/VR technology, specifically using the VirtualSpeech platform, in developing communication skills among students. VirtualSpeech is a leading platform that leverages these technologies to simulate real-world communication scenarios. This research investigates how students engage with AI-powered virtual speech tools in augmented and virtual reality (AR/VR) environments. Further, this study aims to understand the pedagogical, ethical, and social implications of these technologies, focusing on their potential to promote social good, equity, inclusivity, and human agency (Ramy & Ramamoorthy, 2025). By analyzing student interactions, perceptions, and outcomes, the project will generate actionable insights for educators, developers, and policymakers to design more accountable and socially conscious immersive learning systems (Mentzer et al., 2025; Patterson et al., 2025).

Methodology

This exploratory, cross-sectional, survey-based research study assesses the outcomes of a pedagogical intervention in the form of a project-based learning activity where students used AR/VR Meta Quest headsets configured with VirtualSpeech with unique AI-driven simulations. Using a cross-sectional survey based on the Intrinsic Motivation Inventory (IMI), the study measured self-reported levels of communication competence, user experience, and motivational factors (interest/enjoyment, perceived competence, pressure, and choice) among the participants. The study sought to identify correlations between (self-reported) participant competence, motivation, and the technology through the learning experience.

Procedure

The study participants involved thirty-three undergraduate students enrolled in Cybersecurity and IT courses (such as CYBER 100, SRA 211, and CYBER 221) who participated in the study as part of a class activity.

Students enrolled in our Security and Risk Analysis courses (SRA 211 and CYBER 221) followed the same series of steps to ensure the process was consistent for all participants.

1. Training Phase:

- i. Preparation: Students researched a current security risk following standard operating procedures for security risk analysis researchers.
 - ii. Experimental: Students completed a VirtualSpeech AR/VR session where they presented a risk assessment to an AI avatar through preloaded questions provided by a Chief Information Security Officer (CISO) from an industry environment.
2. Post-assessment: Evaluation of confidence and anxiety levels with experiments.

Data Collected

To determine how the AR/VR exercise influenced students' confidence and performance, two primary forms of data were collected.

- Post-experiment confidence scores were reported in this research.

AI-calculated scores via VirtualSpeech AI coaching were collected; however, those scores were not reported in this work as the underlying engine for analysis was proprietary to VirtualSpeech and outside the scope of the Intrinsic Motivational Index (IMI) survey tool.

Data Analysis

Likert-scaled survey items were analyzed using descriptive and inferential statistics. For tests of significant difference between demographic groups, the researchers chose to use a Mann-Whitney U test, which is typically used with non-parametric data and (statistically) independent populations. The tests are also widely used with small sample sizes. All data analysis was conducted using the R statistical computing programming language.

Research Questions

To better understand how these AR/VR simulations shape students' confidence, preparedness, and perceived skill development, this study examines the following research questions.

- **RQ1:** Does using AR/VR VirtualSpeech improve communication confidence and reduce anxiety in cybersecurity students?
- **RQ2:** Does practicing in a virtual environment make students feel more prepared for real world scenarios?
- **RQ3:** Do students believe the experience helps them improve their communication skills?

Results/Findings

1. Overall Impact on Communication Competence

To assess communication competence, the researchers used an adapted version of the previously validated Self-Perceived Communication Competence (SPCC) scale. The self-report survey covers four communication contexts: public, meeting, group, and dyad. Students rate their competence in each scenario using a 5-point Likert-scale (see Table 7 in Appendix A for question set).

The mean scores across these items indicate that students achieved moderate-to-high levels of perceived competence with the AR simulation. Mean scores ranged primarily between 3.4 and 4.6 on a 5-point Likert scale, indicating that they perceived themselves as "somewhat competent" to "competent" in a variety of speaking contexts.

Table 1 summarizes the most statistically significant responses in this group:

Table 1. Post-Simulation Communication Competence (n = 33)

Communication Context	M	SD	Median	Min	Max
Present a talk to strangers	3.81	0.54	4	3	5
Talk with acquaintance/colleague	4.23	0.67	4	3	5
Talk in large meeting of friends	4.32	0.79	4	2	5
Talk in small group of strangers	3.84	1.10	4	1	5
Talk with a friend	4.61	0.67	5	3	5
Talk in large meeting of strangers	3.45	1.23	4	1	5
Present to senior leaders	3.42	1.12	3	1	5

Note. Scale ranged from 1 (Extremely incompetent) to 5 (Extremely competent).

The areas scored with the highest communication competence levels were talking with a friend ($M \approx 4.61$), talking in a small group of friends ($M \approx 4.58$), and talking in a large meeting of acquaintances ($M \approx 4.12-4.25$).

The lower mean scores in these areas - talking in a large meeting of strangers ($M \approx 3.45$) and presenting to senior leaders ($M \approx 3.42$ overall) - suggest that students felt less communications competence in those situations.

These patterns suggest that while students maintain higher baseline confidence in familiar social contexts, their feedback suggests that they perceive the AR/VR simulation had some influence in strengthening their competence in more formal or high-pressure professional scenarios, including interactions with authority figures (e.g., the simulated CISO).

2. Intrinsic Motivation Inventory (IMI) Measures

Students were asked to rate the extent to which they agreed or disagreed with a series of statements about the activity (see Table 8 in Appendix A for question set). Each statement was rated on 5-point Likert scale (1 - Strongly disagree, 5 - Strongly agree). The median scores derived from the samples form the basis of the Intrinsic Motivation Inventory (IMI) results summarized in Table 2.

Table 2. Intrinsic Motivation and Emotional Response to AR Simulation (IMI)

Variable	M	SD	Interpretation
I found the activity interesting	4.10	1.01	High engagement
Doing the activity was fun	4.10	0.98	Positive affect
I enjoyed the task very much	3.81	0.95	Strong enjoyment
I felt competent	4.03	0.60	High perceived competence
I felt skilled	3.55	0.93	Moderate-high skill perception
I did not feel nervous	3.32	1.01	Moderate comfort
I felt tense	3.26	1.24	Moderate activation
I felt anxious	3.03	1.16	Moderate anxiety
I felt relaxed	3.35	1.02	Moderate relaxation

Note. Scale ranged from 1 (Strongly disagree) to 5 (Strongly agree).

Self-Determination Theory (n.d.) describes the Intrinsic Motivation Inventory (IMI) as a multidimensional tool commonly used in research to assess individuals' subjective experiences of an activity. The IMI results suggest that students viewed the AR/VR headset simulation experience positively. The most notable feedback from their responses is summarized in three different contexts below.

Engagement & Interest

The significant findings from the survey items related to engagement and interest include:

- "I found the activity very interesting" ($M \approx 4.10$)

- “Doing the activity was fun” ($M \approx 4.10$)
- “I enjoyed doing the task very much” ($M \approx 3.81 - 4.09$ range)

These findings indicate strong engagement and intrinsic motivation, which aligns with experiential learning theory. They further suggest that immersive simulation enhances emotional investment in practice-based learning.

Competence & Skill Perception

The significant findings from the survey items related to competence and skill perception include:

- Feeling competent ($M \approx 4.03$)
- Feeling skilled ($M \approx 3.55 - 4.09$ depending on group)
- Satisfaction with performance ($M \approx 3.58 - 3.73$)

This indicates that students not only participated in the simulation but perceived growth in their communication ability, an important indicator of improved self-efficacy.

Anxiety & Emotional Response

The survey items where students expressed their feelings about their anxiety level showed more variability. The more notable results include:

- “I did not feel nervous” ($M \approx 3.32$)
- “I felt tense” ($M \approx 3.26 - 3.86$ depending on group)
- “I felt anxious” ($M \approx 3.03$ overall)

The fact that the median scores fall into the middle of the scale suggests that the simulation produced moderate performance activation. This means that the simulation shows indicators of having an effect that could be perceived as reducing anxieties at some level, but not at a level that allowed the student to alleviate those feelings of anxiety completely. From an exposure-learning perspective, this is optimal. The students’ interaction with the avatar provided sufficient realism to trigger a typical anxiety response without excessive stress.

3. User Experience Questionnaire (UEQ)

The researchers chose the previously validated user-experience questionnaire (UEQ), a survey instrument that has been widely used in multiple contexts to gather data on usability of digital tools, such as VirtualSpeech.

Students rated a series of items that listed pairs of contrasting attributes (see Table 9 in Appendix A for specific attribute pairs) that collectively provided us with a User Experience evaluation. The higher ratings represented their satisfaction with the attributes that were indicative of a favorable experience.

Table 3. User Experience Evaluation (UEQ) of AR Headset Simulation

UEQ Dimension	M	SD
Supportive - Obstructive	4.32	0.70
Easy - Complicated	3.65	1.14
Efficient - Inefficient	4.03	0.87
Clear - Confusing	4.13	1.06
Exciting - Boring	3.73	1.23
Inventive - Conventional	3.32	1.11
Cutting Edge - Usual	3.68	1.08

Note. Higher scores reflect more positive user experience perceptions.

The results indicate that the AR/VR headset experience was rated positively across usability and innovation dimensions. The attributes that earned the highest mean scores were Supportive ($M \approx 4.32$), Clear ($M \approx 4.13$), Efficient ($M \approx 4.03$), Exciting ($M \approx 3.73$) and Cutting Edge ($M \approx 3.68$).

The only lower-scoring item was the reversed “Interesting - Not Interesting” pair (the mean reflects positive orientation). Overall, the UEQ results indicate that students perceived the technology as innovative, clear, and supportive rather than obstructive or confusing.

This is important because technological friction can undermine learning outcomes. Students were able to adapt quickly to the equipment which allowed them to focus on the exercise tasks to generate meaningful results. The high clarity and efficiency scores suggest that the headset interface did not meaningfully impede performance confidence.

4. Demographic Differences

Students responded to a series of questions to help us develop a demographic profile of the respondents. The following highlights specific findings that are significant based on those profiles.

Upper vs. Lower Division Students

In general, there were no significant differences in responses between upper and lower division students across most confidence and competence items, indicating broad consistency of effect across academic levels. However, Table 4 highlights one specific variable in the data that stood out:

Table 4. Upper vs. Lower Division Students: Significant Differences

Variable	Lower Division M	Upper Division M	W	p
Felt tense during activity	3.86	2.81	168	.017*

Note. Mann-Whitney U test. * $p < .05$. Lower division $n=14$, upper division $n=16$.

Question 3.2.5 in the IMI portion of the survey asked the students to rate the question “I felt tense while doing this activity”. The results yielded a higher incidence of responses from the lower-division students who reported significantly higher tension than upper-division students ($p = 0.017$).

This suggests that students in the early stages of their curriculum may be a prime target for introducing these technologies as an integral part of their development. The encouraging feedback from the upper-division students suggests there are potential benefits to be gained by expanding these exercises through more lower division courses students would take in their first two years.

First-Generation vs. Non-First-Generation Students

Survey respondents were asked to identify whether they are first-generation students. Their feedback is particularly relevant because over fifty percent of the students attending our campus identify as being first-generation students. The first-generation students who participated in the survey responded favorably to the communications competence and IMI survey items. The most notable responses are summarized in Table 5 below:

Table 5. First-Generation vs. Non-First-Generation Students: Significant Differences

Variable	First-Gen M	Non-First-Gen M	W	P
Comfort presenting to senior leaders	2.73	3.74	52	.021*
Enjoyed activity while doing it	4.09	3.21	152	.036*
Activity was fun	4.55	3.89	148	.045*
Found activity interesting	4.36	3.47	159	.015*

Variable	First-Gen M	Non-First-Gen M	W	P
Felt relaxed during activity	4.09	2.89	173	.002**

Note. Mann - Whitney U tests. *p <.05. **p <.01. First-generation n=11, non-first-generation n=19.

First-generation students produced statistically significant findings in the following areas:

- Greater improvement in comfort presenting to senior leaders (Q2.1.15, p = 0.021)
- Higher perceived enjoyment and competence during the activity (Q3.1.6, p = 0.036)
- Greater enjoyment of the task (Q3.2.2, p = 0.045)
- Higher interest (Q3.2.3, p = 0.015)
- Significantly higher relaxation (Q3.2.6, p = 0.002)

The results also suggest that the immersive AR simulation has statistically significant positive effects for first-generation students when compared to non-first-generation students, especially in:

- Confidence when communicating with authority figures
- Emotional comfort
- Enjoyment and engagement
- Reduced anxiety

Given that first-generation students often report lower baseline academic self-efficacy in professional communication contexts, the headset simulation may serve as a powerful equalizing intervention (Ramos-Sánchez & Nichols, 2007).

Discussion of Findings

The stated goal of the research study was to measure the effectiveness of the headset experience in improving public speaking confidence. Our overall interpretation of the results in each outcome domain is summarized below in Table 6.

Table 6. Overall Summary of AR/VR Simulation Outcomes

Outcome Domain	Overall Interpretation
Communication Confidence	Moderate to High
Perceived Competence	High
Intrinsic Motivation	Strong
Anxiety Activation	Moderate (productive arousal)
User Experience	Positive, clear, supportive
Equity Impact	Strong positive effects for first-generation students

While our study design does not have a corresponding baseline of communications competence for direct comparison to these results limiting causal inference, the following evidence supports its effectiveness:

1. High post-activity competence ratings across communication scenarios.
2. Strong perceived competence and skill acquisition (IMI).
3. Positive emotional engagement and moderate anxiety activation.
4. Strong usability and innovation ratings (UEQ).
5. Statistically significant confidence-related improvements among first-generation students.

Together, these findings suggest that the AR/VR headset simulation:

- Successfully created an immersive, engaging communication practice environment.
- Promoted self-efficacy and perceived competence.

- Reduced anxiety for certain student groups.
- Was perceived as clear, efficient, and supportive rather than obstructive.

Conclusions and Future Research

The Fall 2025 AR/VR study demonstrates that immersive simulation is a viable and promising intervention for improving public speaking confidence in higher education settings. Based on the initial pilot of the technology results the findings were particularly effective in four areas: 1) enhancing perceived communication competence, 2) supporting experiential learning through realistic practice, 3) increasing intrinsic motivation and enjoyment, 4) benefiting first-generation students in professional communication scenarios.

Although the absence of pre-test data limits definitive claims about the magnitude of improvement, the consistently positive competence, engagement, and usability ratings combined with statistically significant subgroup effects strongly support the pedagogical value of immersive AR simulations for communication training. However, in noting the absence of pre-test data, the Intrinsic Motivation Inventory (IMI) is not meant to gather pre and post data. It did, however, provide the ability to assess students' subjective experience on the targeted activity. We will review additional data gathering tools as we continue to develop this project.

This project demonstrated that Immersive AR/VR and AI-driven simulations can significantly improve student communication skills, engagement, and confidence. Results from the Fall 2025 cohort further support these findings, showing consistent improvements across diverse student groups and course types. The 2026 expansion into internship preparation courses will highlight the flexibility and scalability of this approach beyond cybersecurity and IT disciplines. Future research will focus on customized VirtualSpeech scenarios, long-term impact, deeper statistical analysis, and broader implementation across academic disciplines. We will also expand the research to include additional campus locations to advance our analysis.

Additional future research has the potential to significantly advance educational practices by demonstrating how Immersive AR/VR technologies can enhance communication skill development in diverse learning environments (Radianti et al., 2020; Patterson et al., 2025). By leveraging platforms like VirtualSpeech, the study supports more inclusive and accessible training methods that accommodate different learning styles and increase confidence levels associated with public speaking (VirtualSpeech, 2023). The integration of AI-driven simulations offers scalable, personalized learning experiences that can be adapted across disciplines and institutions (Cinar et al., 2024; Muzata, 2024). The broader impact seeks to: advance social accountability in educational technology, promote equitable access to immersive learning experiences, inform transparent and ethical AI governance in academic settings, and support inclusive pedagogical practices that reflect diverse student needs. Beyond academic settings, the findings may inform workforce development programs, professional training, and continuing education initiatives, helping individuals build essential soft skills in a safe, controlled, and engaging environment (Ramya & Ramamoorthy, 2025). As immersive technologies become more prevalent, the continuation of this research contributes to shaping evidence-based strategies for their effective use, promoting digital literacy, and preparing students for communication demands in increasingly virtual and hybrid professional landscapes (Mentzer et al., 2025).

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Appendix - Question Guide

Immediately after completing the exercise, participants responded to an online survey to share their impressions of the AR/VR simulation exercise where they discussed scattered spider ransomware with a virtual CIO. Each question is linked to a Likert scale where students assigned a 1 to 5 rating to a series of questions across three major areas:

- Self-Perceived Communication Competency (SPCC) Scale - Rates competency in communicating effectively in various situations (1 - Extremely incompetent, 5 - Extremely competent)

- Intrinsic Motivation Inventory (IMI) - Rates the extent to which they agree or disagree with statements about the activity (1 - Strongly disagree, 5 - Strongly agree)
- User Experience Evaluation (UEQ) - Rates pairs of contrasting attributes (1 - strongly agree with the negative attribute, 5 - strongly agree with positive attribute)

Each section below lists the question verbiage exactly as it appeared in the survey followed by the question set the students assigned their rating.

Communication Scale

Below are fifteen situations in which you might need to communicate. People's abilities to communicate effectively vary a lot, and sometimes the same person is more competent to communicate in one situation than in another. Please indicate how competent you believe you are to communicate in each of the situations described below.

Table 7. Communication Scale

Question Number	Question Summary
Q2.1 1	Present a talk to strangers
Q2.1 2	Talk with a acquaintance/colleague
Q2.1 3	Talk in a large meeting of friends
Q2.1 4	Talk in a small group of strangers
Q2.1 5	Talk with a friend.
Q2.1 6	Talk in a large meeting of acquaintances
Q2.1 7	Talk with a stranger
Q2.1 8	Present a talk to a group of friends
Q2.1 9	Talk in a small group of acquaintances
Q2.1 10	Talk in a large meeting of strangers
Q2.1 11	Talk in a small group of friends
Q2.1 12	Talk in a small group of people in a position of power/leaders.
Q2.1 13	Present a talk to a group of acquaintances
Q2.1 14	Talk to a person in a position of power/leader
Q2.1 15	Present a talk to a group of senior leaders

Intrinsic Motivation Inventory (IMI)

The following question sets will ask you to rate the extent to which you agree or disagree with the following statements regarding the AR activity (the conversation with the CIO about scattered spider ransomware) you just completed in class.

Table 8. IMI

Question Number	Question Summary
Q3.1 1	I think I am pretty good at this activity
Q3.1 2	I think I did well at this compared to others
Q3.1 3	After working at this activity for a while, I feel competent
Q3.1 4	I am satisfied with my performance
Q3.1 5	I felt skilled
Q3.1 6	While I was working on the activity, I was thinking how much I enjoyed it
Q3.1 7	I felt I was doing what I wanted to do while doing activity
Q3.2 1	I found the activity very interesting
Q3.2 2	Doing the activity was fun
Q3.2 3	I enjoyed doing the task very much
Q3.2 4	I did not feel nervous at all while doing this
Q3.2 5	I felt tense while doing this activity

Question Number	Question Summary
Q3.2 6	I felt relaxed while doing this activity
Q3.2 7	I felt anxious while doing this activity
Q3.2 8	I felt pressured while doing this activity

User Experience Evaluation (UEQ)

Consider the AR simulation in which you discussed scattered spider ransomware with a simulated CIO.

The section of the survey consists of pairs of contrasting attributes that may apply to that activity.

The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression.

Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression. Sometimes you may not be completely sure about your agreement with a particular attribute or you may find that the attribute does not apply completely to the particular product. Please remember: there is no wrong or right answer!

Table 9. User Experience Evaluation (UEQ)

Question Number	Question Summary
Q4.1 1	Obstructive → Supportive
Q4.1 2	Complicated → Easy
Q4.1 3	Inefficient → Efficient
Q4.1 4	Confusing → Clear
Q4.1 5	Boring → Exciting
Q4.1 6 (R)	Interesting → Not Interesting
Q4.1 7	Conventional → Inventive
Q4.1 8	Usual → Cutting Edge