Usability assessment of virtual reality as a training tool for oral presentation

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Abstract. One of the widely used teaching-learning strategies in the educational sector is the delivery of oral presentation by students. They are tasked to present their outputs—such as research paper, project, case study findings—to a group of audience. The problem experienced by most students in this type of task is the fear of public speaking combined with the pressure of relaying information effectively. In practice, this problem is resolved by giving more opportunity to students to rehearse repeatedly in front of peers. Organizing such setup, however, becomes almost impossible during times of pandemic when face-to-face interaction is limited, if not prohibited. Hence, this study ventured on assessing the usability of an alternative solution. This is with the use of virtual reality technology that can simulate the traditional training scenario and render it in a virtual environment. Three categories of participants were involved in the rating of its usability—IT students, non-IT students and Trainers. They were given ample time to navigate a public speaking app using a VR headset. Afterwards, they accomplished a survey questionnaire where they assessed the usability of the VR tool as a mode of training for oral presentation. Findings show that the usability rating of virtual reality as a training tool for oral presentation can vary depending on the technological background of users. This is due to the lack of on-screen assistant that would guide users in navigating the system. Despite these minor problems, the use of virtual reality as a training tool for oral presentation is highly recommended. This is supported by the unanimous positive response of participants in the SUS scale measuring their interest in using the VR tool for oral presentation.

1. Introduction

One of the critical skills focused on by 21st Century education is oral communications due to its high demand in the industry. The ability to present effective business proposals and sales pitches is vital for business growth. This is why language curriculums have integrated diverse forms of communication activities to reinforce this skill among students. A very popular activity performed inside the classroom is the delivery of oral presentations. The goal of this activity is to train students to prepare, organize and deliver effective oral presentations for future business meetings and other social professional engagements [1]. In the classroom, students are tasked to present their output, either an assignment, project, research paper, thesis, or capstone project to a group of audience [2]. A more formal structure involves a panel of evaluators who closely examine the procedures, processes and output of the project, as in the case of thesis and capstone projects.

One of the main difficulties experienced by students in oral presentation is public speaking anxiety or the fear of speaking to a group of audience. As research reveals, anxiety can impede students’ production and achievement [3] resulting to their poor delivery. A practical solution to this is to provide more opportunity for students to deliver oral presentation by organizing public speaking activities. This
would involve setting up a conference room and gathering of audience. Yet another problem arises when face-to-face interaction becomes limited due to pandemic. Hence, this study endeavors to look into a technological tool that can help resolve these issues.

In digital technology, a 3-dimensional (3D) environment called virtual reality (VR) is rapidly proliferating the market especially in the gaming industry. This is due to its highly immersive design that attract consumers [4]. It uses sensor devices to capture user movements and facilitate interaction with the virtual environment [5]. The display is rendered using high-definition graphics that can be navigated 360 degrees. With this technology, a virtual conference room can be generated to serve as an alternative training environment for students. In fact, there are a few VR apps commercially available for public speaking. In these apps are virtual conference rooms with virtual humans as audience. The user is positioned at the stage, recreating the traditional scenario of public speaking.

Another significant facet of virtual reality is its ability to facilitate an environment in treating general phobia [6], credit to the realistic sense of presence experienced within the virtual environment [7]. Several studies demonstrated that the use of virtual reality systems in the therapeutic setting yields a promising outcome [8] [9]. Authors refer to the treatment as virtual reality exposure therapy (VRET). Instead of exposing the subject to the real object which they fear, they are exposed to a virtual version of it. The sight of the virtual object stimulates similar emotions to that of the real scenario, thereby achieving the goal of the treatment. This capability of VRET encouraged authors to look into its application over fear of public speaking. Results collated in a systematic review showed consistent findings from different authors, demonstrating the efficacy of this treatment in helping subjects overcome fear of public speaking [10].

The challenge faced by teachers and students in organizing public speaking engagement opportunities can be resolved with the use of virtual reality. It is then the goal of this study to assess the usability of this tool as perceived by its intended users. System usability is a test to investigate whether a system successfully delivers its purpose. It measures the extent to which a product can be used by intended users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use [11]. There are several usability scales crafted by various authors over the years, but the most popular and widely used instrument is the System Usability Scale or SUS [12]. This scale covers a variety of aspects of system usability such as the need for support, training, and complexity, and thus have a high level of face validity for measuring usability of a system [13]. The SUS instrument is generally used after the respondent has had an opportunity to use the system being evaluated, but before any debriefing or discussion takes place [14]. This instrument has been used for a variety of evaluations such as Learning Management System [15], and was modified to match the context of what is being evaluated.

Findings of this study will contribute greatly to the improvement of this technology in its capacity to provide skills training which can benefit both students and teachers. In a classroom with a teacher-to-student ratio of 1 is to 40, there is limited time for teachers to monitor and coach each student especially when targeting specific skills. Hence, the introduction of such technological tool will provide additional option for teachers and students to utilize to supplement skills development.

2. Methodology
An overview of the undertaking of the study is illustrated in Figure 1. Participants were recruited from a state university in a province of Cordillera Administrative Region, Philippines. Participant categories are IT and non-IT students. This would allow comparison of usability rating between students who has strong background in computer technology and those with lesser computer literacy.

For the IT program category, participants were those recruited from Capstone Project class. The final requirement of this class is to present their project output (system prototype) to their teacher and classmates for evaluation. For the non-IT program category, participants were recruited from students of Thesis course—a major curriculum requirement that mandates students to conduct a study and present their research output to a panel of evaluators. They were randomly selected to match the population in the IT program category. The joining of participants was voluntary such that anyone who opted out were
given the opportunity to do so. There was a total of 20 IT students and 20 non-IT students. Furthermore, English instructors (N=5) were also recruited to participate in the usability assessment. This is to capture the VR tool’s usability from trainer’s point of view.

Participants were first oriented as a group regarding the procedures of the study and were instructed to report to the training venue during their given schedule. During the VR training period, each participant had the chance to wear a VR headset (Samsung Gear VR) and explore a public speaking app called VirtualSpeech. Figure 2 is a screenshot of the VirtualSpeech app. The virtual humans look very similar to human appearance. They seem to be listening intently with slight nodding gestures, just like in a conference meeting.

Additionally, the app has a voice and eye movement analysis feature that evaluates user’s voice volume, pacing and eye-contact and gives scores at the end of the speech. This is activated by clicking on the Start Analyze button at the beginning of the presentation. They system displays a performance score after the delivery of the presentation. A sample performance score is shown in Figure 3. They app also provides live feedback during speech delivery to remind the speaker to look either to the left or to the right side of the audience, if neglected during the presentation.

The participants navigated the app and rehearsed their oral presentation. They were able to view their performance scores after each rehearsal. The average time spent by all participants in rehearsing in the VR tool is 20 minutes. After using the VR tool, they answered the System Usability Scale (SUS).
The System Usability Scale (SUS) is composed of 10 statements rated basing on respondent’s agreement, using a Likert-type scale: strongly agree, agree, neutral, disagree, and strongly disagree [12]. The usability score using SUS is computed using the formula:

\[
SUS \text{ Score } = (X + Y) \times 2.5
\]

where:

\[
X = \text{Sum of the points for all odd-numbered questions } - 5
\]
\[
Y = 25 - \text{Sum of the points for all even-numbered questions}
\]

Resulting score is interpreted with the following guideline: greater than 80.3 = Grade A or Excellent, 68 to 80.3 = Grade B or Good, 68 = Grade C, or Okay, 51 – 68 = Grade D or Poor; and less than 51 = Grade F or Awful [16].

The usability rating from the three participant categories were tabulated separately. The mean SUS scores and their corresponding interpretation are summarized in tables.

**Figure 3. Sample performance score**

### 3. Findings

Using the SUS equation, the usability scores given by IT, non-IT, and trainer respondents were extracted. They are presented in Table 1.

| Respondents  | SUS Score | Grade | Interpretation |
|--------------|-----------|-------|----------------|
| Trainers     | 69.7      | B     | Good           |
| IT students  | 70        | B     | Good           |
| Non-IT students | 66.3    | D     | Poor           |

According to the assessment of Trainers and IT students, the usability of the VR tool is GOOD, or acceptable; but for the non-IT students, the resulting SUS score is POOR. Factors for such ratings can be inferred from the individual statements in the assessment scale. The statements in the scale are equally divided into positive and negative constructs. Ratings for the positive statements (odd-numbered items) are presented in Table 2, while for negative statements (even-numbered items), Table 3.

Notably, the mean rating across all groups of respondents in Table 2 indicate a unanimous agreement on the positive statements of the scale. This denotes that majority would like to use the VR tool, and they felt that it was easy to use due to the organized integration of its functions. Despite the different levels of technical adeptness of the respondents, they managed to navigate the tool confidently after a short orientation. As first-time users of such technology, their impression was that the system is quite complex as reflected in Table 3. During the orientation, they were guided step-by-step in navigating the virtual environment. The IT students were able to learn to operate the VR tool more quickly than the non-IT respondents. The latter felt the need to be assisted for a longer time before they can comfortably operate the tool on their own.
| Statement                                                                 | Mean   | English teachers | IT Students | Non-IT students |
|--------------------------------------------------------------------------|--------|-----------------|-------------|-----------------|
| 1. I think I would like to use this system to train for oral presentation.| 4.4    | 4.4             | 4.5         |                 |
| 3. I thought the system was easy to use.                                 | 4.1    | 4.1             | 4.1         |                 |
| 5. I think the various functions in the system were well integrated.     | 4.3    | 4.1             | 4.3         |                 |
| 7. I would imagine that most people would learn to use this system very quickly. | 4.4    | 4.1             | 4.2         |                 |
| 9. I felt very confident using the system.                               | 4.1    | 3.6             | 4.0         |                 |
| **Mean**                                                                 | **4.3**| **4.0**         | **4.2**     |                 |

Legend: 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Most of them had difficulty selecting buttons since there was no visible cursor on screen. The only way to determine whether the button is pointed at is when it is highlighted. The non-IT respondents can hardly recognize such indication, making it difficult for them to select the right buttons. As a result, the adjacent button is often selected and they felt it was an inconsistency in the functions of the VR tool. Aside from this technical challenge, the respondents are unfamiliar with the use of a headgear that’s why they felt it was cumbersome to use and tiresome to carry. Another problem observed as the respondents used the VR tool is that during their initial use, they felt the need to remove the head gear within the first 5 minutes because they felt nauseous. This condition was slowly reduced as they had longer exposure to the virtual environment.

| Statements                                                                 | Mean   | English teachers | IT Students | Non-IT Students |
|---------------------------------------------------------------------------|--------|-----------------|-------------|-----------------|
| 2. I found the system unnecessarily complex.                              | 2.6    | 2.2             | 2.6         |                 |
| 4. I think I would need the support of a technical person to be able to use the system. | 3.0    | 2.7             | 3.1         |                 |
| 6. I thought there was too much inconsistency in this system.             | 2.1    | 2.4             | 2.6         |                 |
| 8. I found the system very cumbersome to use.                             | 2.8    | 2.3             | 3.0         |                 |
| 10. I needed to learn a lot of things before I could get going with this system. | 3.1    | 2.8             | 3.3         |                 |
| **Mean**                                                                  | **2.7**| **2.4**         | **2.9**     |                 |

Legend: 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

In general, the acceptable usability rating given by teachers and IT students is mostly credited to the ease of use of the VR tool. On the other hand, the poor usability rating by non-IT respondents is due to their need for technical assistance and longer period of time to get familiarized with the tool. While it is true that a technical person was present, the assistance relayed was limited because only the user can view the virtual scene. There is then a need to improve the user-friendliness of the system. It would make it easier for new users if there was an on-screen assistance to guide them on how to navigate through the virtual environment, or to instruct them on what to do next.

4. Conclusion
As reflected in the findings, the usability rating of virtual reality as a training tool for oral presentation can vary depending on the technological background of users. For IT students and Trainers, the usability rating is Good, or acceptable; while for non-IT students, the usability rating is Poor. The low rating from
non-IT students was due to the need of a technical person, but only during the initial use. This is expected from any other new technology. This study recommends an alternative solution which is the inclusion of an on-screen assistant in the virtual scene that would guide users on how to navigate through the system. Despite these minor problems, the use of virtual reality as a training tool for oral presentation is highly recommended. This is supported by the unanimous positive response of participants in the SUS scale measuring their interest in using the VR tool for oral presentation. While it is true that first-time users face the challenge of navigating through the system, the VR tool is generally very easy to use and its benefits supersedes the challenge.

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