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Do you Want to be a Superhero? Boosting Emotional States with the Booth

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Abstract: Educational practitioners have stressed the relevance of providing learners with a set of 21th century skills that will allow them to face current life challenges. Among others this includes communication and social skills such as public speaking, argumentation, negotiation, etc. Besides the acquisition of knowledge and techniques, these skills have the special characteristic that their performance is usually conducted under emotionally charged and stressful situations. Recent advances in technology have allowed the creation of digital applications to support learners with the development of techniques for this type of skills. However, supporting learners on the preparation of a mindset that allows them to perform well under emotionally charged circumstances is an area that technology enhanced learning has practically overlooked. To examine this gap, we developed the Booth, an application designed to get learners into a powerful and resourceful emotional state. In this article we present a two-step user study. Results of the first evaluation show that the use of the Booth induced a positive emotional state on users. Results from the second step suggest that using the Booth helps learners to emotionally prepare for public speaking.

Keywords: Sensor-based Learning Support, Affective Computing, Immersive Learning, Mental Preparation
Categories: H.5.2, J.4, L.2.3, L.3.1

1 Introduction

Educational researchers, teachers, employers, and policy makers have highlighted the relevance of using educational systems to provide learners with a set of 21st century skills, such as communication and social skills that will help them to function effectively at work and in their leisure time [Ananiadou and Claro, 2009; Dede, 2007; Kalantzis and Cope, 2012]. One variable that has a direct impact in performing well is the emotional state of the performer. Research has shown that the emotional state of

the performer has an influence on sports [Cohn, 1991; Rumbold, Fletcher, & Daniels, 2012], creativity [Lin et al. 2014], workplace [Beal et al. 2005] and academic performance [Cassady and Johnson, 2002]. Performance of learners declines when learners are faced with a feeling of powerlessness. The feeling is usually triggered by stressful events that require learners to fully use their cognitive capacities. This activates the behavioral inhibition system in learners; it forces them to focus on threats rather than on opportunities [Cuddy, 2016b]. Powerlessness also undermines executive functions such as reasoning, task flexibility, attention control, and performance [Derakshan and Eysenck, 2009]. Moreover, it keeps learners from post processing the event days later [Gaydukevych and Kocovski, 2012]. To avoid feeling powerlessness and to improve performance, research has shown that at some point the learner should stop preparing content and start preparing a supportive mindset [Raman et al. 2013; Cuddy, 2016a]. We consider this mindset preparation to be particularly important for the preparation of events that are usually performed in emotionally charged and stressful situations, such as oral presentations, negotiations, debates, interviews, etc.

The emotional state of learners is usually overlooked in common educational practices [Alsop and Watts, 2013; Pierre and Oughton, 2007] and especially technology enhanced learning applications [Schneider et al. 2015] thus failing to provide learners with some of the tools required to perform well. Therefore, to assist learners with their affective preparation, we developed *the Booth* an application designed to bring learners into an emotional state that allows them to perform well. In this article we present a study conducted in two steps. First we evaluated *the Booth* and the impact of its use in normal working day conditions, where participants did not have to prepare for any special event. In the second step we explored the effects of *the Booth* when used as a preparation tool before giving a public presentation on a scientific conference.

2 Background

The integration of sensor technologies with computers systems has led to the creation of immersive learning applications designed to support the acquisition of a wide variety of skills [Schneider et al. 2015]. Examples of these skills include artistic [Van Der Linden et al. 2013; Bevilacqua et al. 2007], sports [Baca and Kornfeind, 2006; Spelmezan et al. 2009], and social and communication skills [Schneider et al., 2016; Damian et al. 2015] among others. Most of these sensor-based applications support learners with the practice of their skills while receiving feedback regarding their performance. This support helps learners to develop the techniques required for the skills. For example the prototype described in [Schneider et al. 2016] allows learners to practice their presentations while giving them feedback regarding their posture, use of gestures, pauses, voice, etc.

Fewer sensor-based applications support learners affectively by allowing them to practice in simulated, less stressful environments. Examples of this can be seen in applications designed to train interview skills, where the learner is allowed to practice while talking to an avatar [Hoque et al. 2013] and also in applications to train presentation skills where the learner can practice in front of a virtual audience [Barmaki and Hughes, 2015; Wörtwein et al. 2015].

Creating opportunities for learners to practice on simulated less stressful environments is not the only method that affectively can help them to prepare for emotionally charged situations. In 1890 William James published his theory regarding human psychology, explaining that our feelings are not the ones guiding our actions, on the contrary our actions are the ones guiding our feelings [James, 1890]. Since then research in line with this theory has given rise to a series of effective exercises that can help people to decrease negative emotions such as anxiety and stress, and increase positive emotions such as confidence and happiness [Wiseman, 2012]. To the best of our knowledge *the Booth* is currently the only application that guides learners through a series of exercises designed to help them to acquire a powerful emotional state. Hence, helping them with the preparation of a supportive mindset for any type of emotionally charged and stressful events that require the display of 21st century skills.

3 The Booth

Some superheroes portrayed in popular culture during the second half of the 20th century used to live their life disguised as civilians and turn into superheroes when needed. In some cases, they used a phone booth to quickly change themselves and bring out their superhero persona. *The Booth* is an application that follows this superhero metaphor. Its aim is to guide users through a series of psychological exercises that have shown to help people with the acquisition of a resourceful emotional state, that allows them to have full access to executive functions such as reasoning, task flexibility, attention control, etc. It presents learners with a narrative consisting of a series of lectures. Each lecture makes use of a different psychological technique designed to boost the emotional state of the user and consists of three phases: explanation, exercise, and report (see Figure 1). To execute the exercises and advance through the different phases of the lecture and the learner can use voice commands or gestures that are being tracked by the Microsoft Kinect V2[1]. The purpose of this type of interaction is to enhance the reflective aspect of the psychological techniques presenting the learner with the opportunity to embody them. From the vast amount of psychological exercises and techniques designed to boost the emotional state, we selected the ones that we found easier to fit with the superhero narrative. In its current version the whole narrative of *the Booth* consists of five lectures and it takes the user between three to eight minutes to go through all of them.

1 https://developer.microsoft.com/en-us/windows/kinect

Figure 1: The Booth: From left to right the figure shows a sequence of screen shots displaying the three steps of the Posture lecture.

3.1 The Booth Narrative

The narrative of *the Booth* starts when the user stands in front of the Kinect sensor, at that moment the application plays a recorded sound asking the user to raise one hand in case she wants to become a superhero. After raising the hand, the user is requested to select a male or a female character. Then the first lecture starts. The following subsections of this article describe the current lectures incorporated in *the Booth,* including the psychological practices and techniques behind the design of each one of them.

3.2 Lecture 1: Superhero Posture

The lecture starts by explaining the learner that the purpose of the lecture is to learn the *superhero posture* (see Figure 2). To stand in this posture the learner has to stand straight, with both feet firmly on the ground at shoulders width, hands rest at hip level, and smiling. The author in [Cuddy, 2016c] explains, that our own body language communicates back to us and influences our state, claiming that expansive body language increases assertiveness, optimism and resilience while reducing stress. It improves our skills, decision taking, perception and strengths [Arnette and Ii, 2012]. In [Cuddy et al. 2015] participants who stood in expansive body postures that express power as preparation for a job interview, significantly outperformed participants who did not use the power postures as preparation. These studies have received some recent criticism because the significant results obtained in them could not be replicated in other studies [Simmons and Simonsohn, 2017]; however, the effects of power posing were not disproved, and standing in the *superhero posture* fits with the narrative of *the Booth*. Facial expressions have also shown to have an effect on people's mental states: e.g. forced smiles have shown to inhibit fear and anxiety in people [Duncan and Laird, 1980], and make them feel happier [Laird, 1974]. During the exercise phase the learner has to stand in this posture in order to proceed to the report phase of the lecture. The report phase of the lecture displays the following message to the learner: "That's the Posture! Don't you feel more powerful now?"

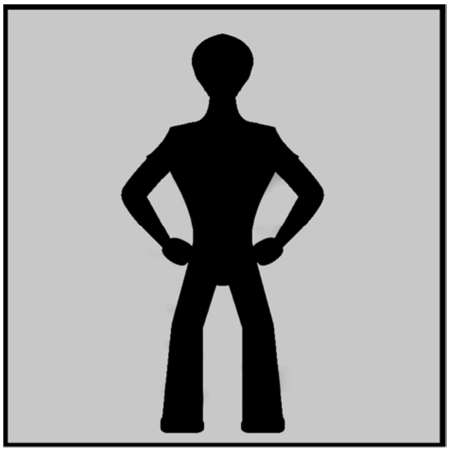

Figure 2: Superhero posture

3.3 Lecture 2: Superhero Powers

The lecture starts by explaining the learner that the purpose of the lecture is to select three *superpowers* that fit with the learner's personality. In contrast with the superpowers of fictional superheroes that have extraordinary abilities impossible to be replicated by humans, the *superpowers* that can be selected during this lecture are personality traits that to a certain degree all humans have. The available *superpowers* to be selected are: assertiveness, charisma, concentration, confidence, creativity, empathy, intelligence, memory, presence and willpower. The purpose of selecting this type of *superpowers* is to help learners to be in touch with the best version of themselves [Roberts et al. 2005], and to emulate self-affirmation techniques [Cohen and Sherman, 2014]. These techniques have shown to help people in reducing their anxiety for stressful situations, helping people to become more open to feedback and improve their problem solving skills under stress [Creswell et al. 2005]. In order to advance through the exercise the learner has to remain in the *superhero* posture and smile while selecting the three from the available *superpowers* either through voice commands or through gestures. Once the learner selects three super powers, the report of the lecture appears and rhetorically asks the learner to imagine how would she stand, walk and talk when having these *superpowers*.

3.4 Lecture 3: Inspiration

The lecture starts by explaining the purpose of the lecture, which is to select a value that the learner finds super inspiring. Exposing or priming people with certain kinds of concepts has shown to have an effect on people's behavior, e.g. in [Kawakami et al. 2003], participants primed with concepts related to the elderly adopted more conservative attitudes and behaviors in contrast to participants who were not primed. This priming effect can also lead to a positive behavioral change as shown in [Schmid et al. 2009], where participants exposed to words that express personal power enhanced their ability to read and relate to people. Following this principle, in this

lecture the learner has to select one value that she finds inspiring out of a list of 18 words including values such as courage, kindness, charisma, honesty, loyalty, presence, etc. The learner can complete the exercise by standing in the *superhero* posture and smiling while using voice commands or gestures to select one of the available values. After the value is selected the report of the lecture appears and rhetorically asks the learner to reflect on how to welcome more of the selected value into her daily life.

3.5 Lecture 4: Saving the World

The lecture starts by explaining the purpose of the lecture, which is to select three concepts that the learner as *superhero* would like to bring to the world. The concepts available for selection are: acceptance, clarity, joy, justice, kindness, love, passion, peace, respect and understanding. To complete the exercise the learner is required to use voice commands or gestures to select three of the available concepts while standing in the *superhero* posture. After making the selection, the report of the lecture appears. The report asks the learner to reflect on how she could use the previously selected *superpowers* in order to bring more of the recently selected concepts to the world (see Figure 3). A screenshot of this report is automatically posted on Twitter for learners to look at it and share it after the intervention. This lecture brings back the concept of self-affirmation, exposing learners to encouraging ideas, and aims to shift the mind of the learner into helping others. Helping others while being in a positive state has shown to increase happiness [Otake et al. 2006], and life satisfaction [Buchanan and Bardi, 1992].

Figure 3: Screenshot of the report of Lecture 4

3.6 Lecture 5: Celebration

The lecture starts by explaining the learner that is time to celebrate the *superhero* achievements. The exercise of the lecture consists on asking the learner to raise both arms. Once the learner raises both arms, *the Booth* starts playing a popular tune of music [Vangelis, 1981] that has been used to illustrate sports achievements since

1981. While the learner is raising her arms and listening to the music *the Booth* prompts the following message to the learner: "Remember a time when you won something. How great did it feel?" Raising both of our arms above our shoulders forming a V-shape is a universal expression of power. Humans from all cultures use that posture to express victory and celebration [Tracy and Matsumoto, 2008]. After finishing the lecture *the Booth* displays the following quote: "Don't fake it 'till you make it. Fake it 'till you become it" [Cuddy, 2012].

4 Evaluation

The evaluation of *the Booth* presented in this article consists of a study conducted in two steps. In the first step of the study we evaluated the use of *the Booth* and its impact on participants as a standalone task. In the second step of the study we explored the use of *the Booth* and its impact as a preparation tool for oral presentations during a conference.

4.1 First Step

Before testing whether *the Booth* is suitable to be used as an emotional preparation tool for an emotionally charged event, we first needed to find an answer to the following research questions:

- RQ1a) Are there any usability issues that obstruct the use of *the Booth*?
- RQ1b) Does *the Booth* have a positive effect on the emotional state of users?

The objective of the first research question is to identify the usability issues that can hinder the experience of using *the Booth*. The objective of the second research question is to investigate the influence that the use of *the Booth* has on the emotional state of users in a neutral scenario, in order to determine whether it would be appropriate to use it during stressful situation.

To study these two research questions, participants used *the Booth* as a standalone task during a regular working day, where they did not have to prepare for any special event.

4.1.1 Participants

A total of 40 participants, 22 females and 18 males took part in this first evaluation of *the Booth*. The age of the participants ranged from 21 to 64, with an average age of 41 years. All participants were professionals working at a university with similar European cultural background. We recruited the participants by personally asking them to participate in our study

4.1.2 Apparatus and Materials

The apparatuses used for this study were a 50-inch monitor, a Microsoft Kinect V2 sensor and a laptop running *the Booth*. To evaluate the effects of *the Booth* we used a pre-questionnaire and a post-questionnaire. The pre-questionnaire inquired the current emotional state of the participants. This questionnaire consisted of one item asking participants to select one or multiple choices from a list of 23 different emotions, including the option to name other emotions. The majority of the emotions chosen for

the list were extracted from the literature regarding the psychological used in the different lectures of *the Booth* (See section 3). Then some more emotions were added in order to have a balanced list of positive and negative emotions. In total there were 11 positive and 11 negative emotions including the *Neutral* emotion. Table 1 displays the list of emotions grouped by positive and negative emotions.

The post-questionnaire consisted of six items. The first item inquired the current emotional state of the participant, same as the item from the pre-questionnaire. This post-questionnaire had also four items using Likert-scaled items inquiring about the confidence of the participant, enjoyment of using the Booth, easiness of use, and sharing the experience in social networks. It had one more final item asking participants to share some remarks. Finally during the interaction an observer was taking notes.

Positive		Negative	
Confident	Happy	Angry	Pessimistic
Energetic	Joyful	Annoyed	Selfish
Enthusiastic	Motivated	Anxious	Stressed
Excited	Optimistic	Bored	Tired
Generous	Powerful	Depressed	Upset
Grateful		Discouraged	

Table 1: List of emotions grouped by positive and negative

4.1.3 Method

Participants arrived to the session and were asked to fill in the pre-questionnaire. Then they were asked to stand at a distance of approximately 2.5m in front of the monitor and the sensor. At this point the experimenter explained the participant how to interact with the system (using gestures and/or voice commands). After the explanation, the experimenter started *the Booth*. Participants interacted with *the Booth* following its whole narrative. Finally they filled in the post-questionnaire. The whole procedure lasted around 10 minutes in total.

4.1.4 Results

Regarding usability, the data extracted from the notes of the observer, remarks from the participants and the post-questionnaire item regarding the easiness of use show no substantial usability issues that could obstruct the interaction with *the Booth*. We observed that participants preferred to use voice commands instead of gestures. One minor issue observed has to do with the recognition of the voice commands, some commands had to be repeated several times. The most problematic command was *Start*. This command was used in order to start each lecture. In order to solve this issue for the second step of the study we substituted the command *Start* with *Next*, which showed to be recognized better by the system.

Results regarding the user experience of *the Booth* extracted from the first study are displayed in Table 2 The scores given by the participants range from one to five, with five showing a total agreement with the statement. These results show that on average participants reported their experience of using *the Booth* as enjoyable. On

average they found *the Booth* relatively easy to use, and reported to feel a bit more confident after using it.

Question	Mean	Standard Deviation
• I enjoy using the Booth	4.15	0.70
• I Felt more Confident after using the Booth	3.4	0.90
• The Booth is easy to use	3.65	1.00
• I like to share my experience with the Booth	3.35	1.00

Table 2: User Experience Results

When analyzing the self-reported emotional state of the participants before and after using *the Booth* substantial differences can be observed. 36 out of the 40 participants reported a change in their emotional state.

Before using the Booth, *Neutral* got the most selections by participants followed by *Happy* and *Motivated*. After using *the Booth, Happy* was the emotion that got the most selections followed by *Energetic* and *Enthusiastic*. Table 3 displays all the self-reported emotional states before and after using *the Booth*.

To continue with our analysis on the effects on the emotional state of participants influenced by the use of *the Booth* we separated the different emotions into two groups: negative emotions and positive emotions (see Table 1). We conducted a t-test to compare the number of the negative emotions reported by the participants before and after using *the Booth*. Participants before the treatment reported more negative emotions (M=0.53, SD=0.7) than after the treatment (M=0.15, SD=0.36); $t(58)=2.96$, $p=0.004$. These results show that using *the Booth* helped participants to reduce their negative emotions.

We also conducted a *t*-test to compare the amount of positive emotions reported by the participants before and after using *the Booth*. Participants before the treatment reported a significant lower amount of positive emotions (M=1.62, SD=1.41) in comparison of the reported positive emotions after the treatment (M=3.38, SD=1.69); $t(74)=4.85$, $p<0.001$. These results indicate that the use of *the Booth* helped to induce positive emotions on the participants.

Figure 4 shows the differences between the reported negative and positive emotions grouped by the number of participants before and after using *the Booth* grouped by the number of participants.

Emotion	Before using the Booth	After using the Booth	Difference
Angry	0	0	0
Annoyed	0	0	0
Ashamed	0	1	1
Anxious	3	0	-3
Bored	1	0	-1
Depressed	1	0	-1
Discouraged	0	0	0
Pessimistic	0	0	0
Selfish	0	0	0
Stressed	7	2	-5
Tired	10	3	-7
Upset	0	0	0
Neutral	26	5	-21
Confident	12	17	5
Energetic	4	19	15
Enthusiastic	6	18	12
Excited	1	10	9
Generous	4	1	-3
Grateful	3	2	-1
Happy	13	26	13
Joyful	7	17	10
Motivated	13	15	2
Optimistic	0	0	0
Powerful	3	11	8
Relaxed	1	1	0
Thoughtful	1	0	-1

Table 3: Self-Reported Emotional State (alphabetically sorted in negative, neutral and positive emotions)

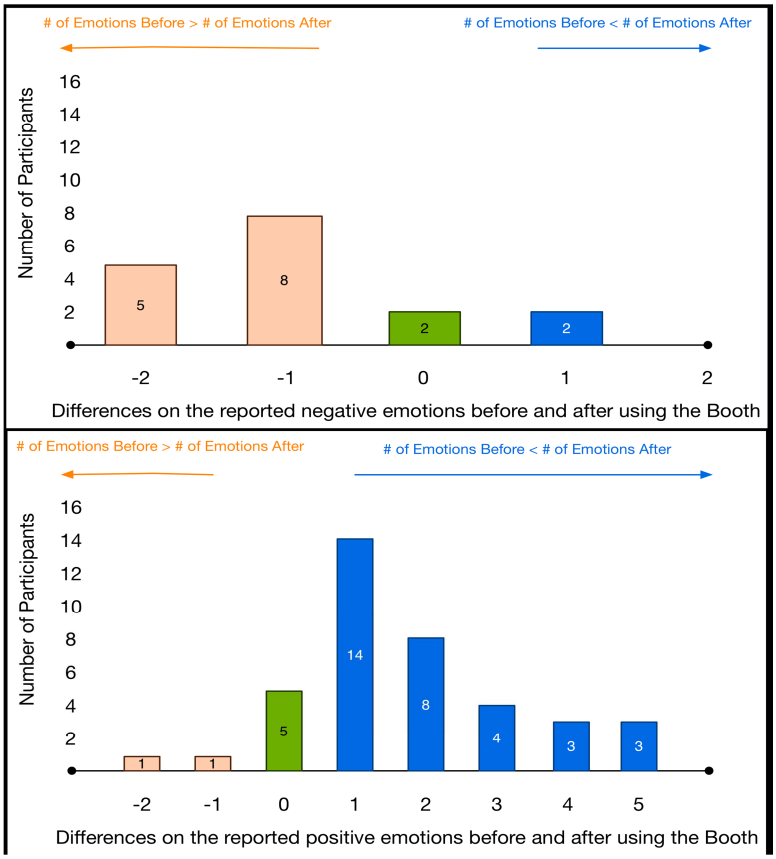

Figure 4: Top: the differences for the reported negative emotions grouped by the number of participants before and after using the Booth. Bottom: the differences for the reported positive emotions grouped by number of participants before and after using the Booth.

4.2 Second Step

After observing that there were no important usability issues able to hinder the use of *the Booth*, and determining that it has a positive effect in the emotional state of users, we moved to the second step of the study. The purpose of this second step of the study was to explore *the Booth* as a tool designed to help learners with the preparation of a supportive mindset for emotionally charged and stressful events that require them to display their skills. Therefore for this second step, we selected to test *the Booth* in the context of a scientific conference in technology-enhanced learning, where participants are required to orally present their research. This second step of the study was guided by the following research question:

RQ2) Does the use of *the Booth* help people to acquire a resourceful and powerful emotional state that allows them to perform well during a presentation?

4.2.1 Participants

A total of 18 participants, seven females and 11 males took part on this second step of the study. The age of the participants ranged from 23 to 62 with an average age of 36. For this second study we had a control and a treatment group with nine participants on each group. The assignation of the participants into the different groups was done according to the schedule of the conference presentations. Speakers scheduled as first speakers of their corresponding sessions were assigned to the treatment group, since they could use *the Booth* in between the breaks of the conference just before their presentation. Speakers who had to give their presentation in between sessions were assigned to the control group.

4.2.2 Apparatus and Materials

For the treatment group in this study we used a laptop computer to run *the Booth*, and a Microsoft Kinect V2 sensor. *The Booth* was displayed either through a projection, on a 50-inches monitor or on the laptop screen depending on the equipment that was available for the conduction of each individual test. This change of displays was introduced because the conference had sessions running in different rooms, and the equipment available in each room was different. Participants from the treatment group got the task of studying their slides before giving their presentation. Both groups of participants filled in three questionnaires: a pre-questionnaire, a post-questionnaire, and a post-presentation questionnaire. The item used to determine the emotional state of the participant was the same one that was used in the first step of the study. The pre and post-questionnaires consisted of this one item. The post-presentation questionnaire consisted of two items: a Likert-Scaled item inquiring the self-satisfaction of the given presentation, and a second item where participants could express additional comments.

4.2.3 Method

The tests started with asking participants to fill in the pre-questionnaire some 15 minutes before the start of their presentations. On the second step participants of the treatment group were asked to interact with *the Booth*. For this interaction participants stood some 2.5m in front of the monitor and sensor, and were quickly debriefed on how to interact with it. The experimenter started *the Booth,* and participants used it through its whole narrative. After interacting with *the Booth* participants filled in the post-questionnaire. Instead of using *the Booth* participants from the control group were asked to study their slides as they normally do before giving a presentation. After that, participants from the control group answered the post-questionnaire. At the end of their respective presentations, participants from both groups were asked to answer the post-presentation questionnaire.

4.2.4 Results

Table 4 shows the self-reported emotional state of the participants from the control group and treatment group before and after studying the slides in the case of the control group, and before and after using *the Booth* for the treatment group.

Regarding the self-reported emotional states before and after studying the slides, six emotions presented a difference between the pre and post-questionnaire. The emotion that presented the biggest difference is the self-reported happiness of the participants. Three participants reported to be happy before the preparation and did not report to be happy after it.

	Control Group			Treatment Group		
Emotion	Before	After	Diff	Before	After	Diff
Angry	0	0	0	0	0	0
Annoyed	0	0	0	1	0	-1
Ashamed	0	0	0	0	0	0
Anxious	5	4	-1	4	1	-3
Bored	0	0	0	1	0	-1
Depressed	1	0	-1	0	0	0
Discouraged	0	0	0	0	0	0
Nervous	0	0	0	2	0	-2
Pessimistic	1	1	0	1	0	-1
Shaky	1	1	0	0	0	0
Selfish	0	0	0	0	0	0
Stressed	4	4	0	3	2	-1
Tired	0	2	2	5	3	-2
Upset	0	0	0	0	0	0
Neutral	0	0	0	2	1	-1
Confident	5	5	0	0	3	3
Energetic	2	2	0	2	4	2
Enthusiastic	2	2	0	3	6	3
Excited	3	3	0	4	2	-2
Focused	0	1	1	0	0	0
Generous	1	1	0	0	0	0
Grateful	1	1	0	1	0	-1
Happy	3	0	-3	2	5	3
Joyful	1	1	0	0	6	6
Motivated	4	4	0	5	5	0
Optimistic	3	4	1	4	5	1

	Control Group			Treatment Group		
Emotion	Before	After	Diff	Before	After	Diff
Powerful	0	0	0	0	3	3
Relaxed	0	0	0	0	1	1

Table 4: Self-Reported Emotional State for Control and Treatment Group

In the case of the treatment group 18 emotions presented a difference between the self-reported emotional states before and after the use of *the Booth*. The biggest difference deals with the self-reported joy from the participants, showing that six participants reported to feel joyful after the intervention. The self-report of participants shows that emotions such feeling anxious, nervous or stressed, which usually have a negative effect on presenters, decreased after *the Booth* intervention. On the contrast, the reports on opposite emotions such as feeling confident, powerful and optimistic increased after the intervention. In general after using *the Booth* participants reported an increment of emotional states associated to a positive connotation and a decrement of emotional states associated to a negative one.

Similar as in the previous step of the study we grouped the emotions into negative and positive ones. We compared the amount of self-reported negative emotions for both groups before the intervention using a heteroscedastic t-test. Before the intervention the control group reported slightly less negative emotions (M=1.33, SD=1.41) than the treatment group (M=1.89, SD, 1.23); t(16)=0.88, p=0.34. This shows no significant difference between the selections of negative emotions for both groups.

We compared once more the amount of self-reported negative emotions after the interventions using a heteroscedastic t-test. In this case the control group reported to have more negative emotions (M=1.44, SD=1.13) than the treatment group (M=0.67, SD=0.87): t(15)=1.64, p=0.12. Results from this test show a non-significant trend in the direction that after using *the Booth* participants will report to have less negative emotions than participants who studied their slides.

We conducted paired t-tests comparing the means between the reported negative emotions before and after the intervention for both groups. The purpose of these tests is to explore the influence of each intervention in the amount of self-reported negative emotions. In the case of the control group before studying the slides participants reported to have slightly less negative emotions (M=1.33, SD=1.41) than after studying them (M=1.44, SD=1.13); $t(8)=0.26$, $p=0.80$. The difference observed is too small to tell if studying slides had an influence on the reported negative emotions.

In the case of the treatment group, results from the paired t-test show that the amount of negative emotions reported before using *the Booth* was significantly higher (M=1.89, SD=1.23) than after the treatment (M=0.67, SD=0.87); $t(8)=3.35$, $p=0.01$. These results show that the use of *the Booth* had an influence in reducing the amount of self-reported negative emotions.

Figure 5 shows a comparison of the differences between the reported negative emotions grouped by the number of participants from both groups before and after the

received treatment. The figure reveals that two participants reduced the amount of negative emotions after studying the slides, while six participants reduced the amount of negative emotions after using *the Booth*. Figure 5 also shows that two participants from the control group reported an increment in the amount of negative emotions, while none of the participants from the treatment group reported an increment.

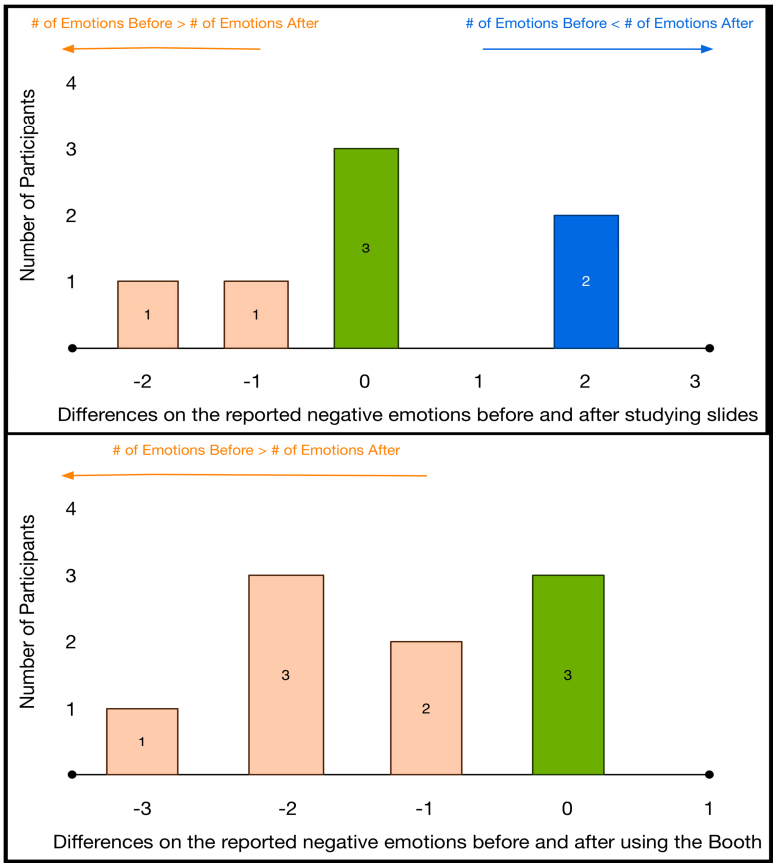

Figure 5: Top: the differences for the reported number of negative emotions grouped by the number of participants from the control group. Bottom: the differences for the reported number of negative emotions grouped by the number of participants from the treatment group.

We conducted a heteroscedastic t-test to compare the self-reported positive emotions for both groups before the interventions. Results from this test show that the control group reported to have slightly more positive emotions (M=2.78, SD=3,03) than the treatment group (M=2.33, SD=1.58); t(12)=0.39, p=0.7. Results from this test reveal no significant difference in the selection of positive emotions between both groups.

We conducted the heteroscedastic t-test once more to compare the self-reported positive emotions after the interventions. Results from this test show that the control group reported to have *marginally* significant less positive emotions (M=2.44, SD=2) than the treatment group (M=4.44, SD=2.18); t(16)=2.02, p=0.06.

To explore the influence of each intervention in the amount of self-reported positive emotions, we used a paired *t*-test to compare the means of self-reported positive emotions before and after the treatment for both groups. In the case of the control group participants reported to have slightly more positive emotions before studying the slides (M=2.78, SD=3.03) than after studying them (M=2.44, SD=2); $t(8)=0.5$, $p=0.63$. The difference observed is too small to tell whether studying the slides had an effect in the reported positive emotions of the participants. For the treatment group the amount of reported positive emotions was considerably lower before using *the Booth* (M=2.33, SD= 1.58) than after its use (M=4.44, SD=2.19); $t(8)=3.64$, $p=0.004$. These results indicate that the use of *the Booth* helped participants to enter into a positive emotional state.

Figure 6 shows a comparison of the differences between the reported positive emotions grouped by the number of participants from both groups before and after the received treatment. This figure shows that three participants from the control group decreased the amount of reported positive emotions after studying the slides, while none of the participants who used *the Booth* reported a decrease in positive emotions. Four participants from the control group reported an increment in their positive emotions in comparison with seven of the participants from the control group.

The post-presentation questionnaire asked participants to rate their self-satisfaction of the given presentation; we compared the means of the level of self-satisfaction for both groups using a heteroscedastic t-test. Results from this test show no significant difference between the average reported level of self-satisfaction from the treatment group (M=4.11, SD=0.92) than the control group (M=4.0, SD=1); t(16)=0.24, p=0.81.

In the additional comments section of the post-presentation questionnaire five participants from the control group claimed that their level of satisfaction of the presentation depended on the amount of questions and usefulness of feedback given by the audience. One participant from this group commented about the difficulty to give a presentation in English, and another one commented to still be shaky after the presentation. Two participants of the control group did not have extra comments.

Regarding the additional comments from participants of the treatment group, four participants commented that overall it was good to use *the Booth*. One of them provided also some ideas for extra exercises e.g. warming up the voice, and doing different warming up movements and postures. Two participants from the treatment group commented to feel confident once the presentation started, and remained confident even when some struggles appeared. One participant reported to feel confident during the presentation, and asked whether it is possible to know if this was the result of the placebo effect or the intervention. One participant remarked not feeling fit on that day. Finally one last participant did not leave any additional comments.

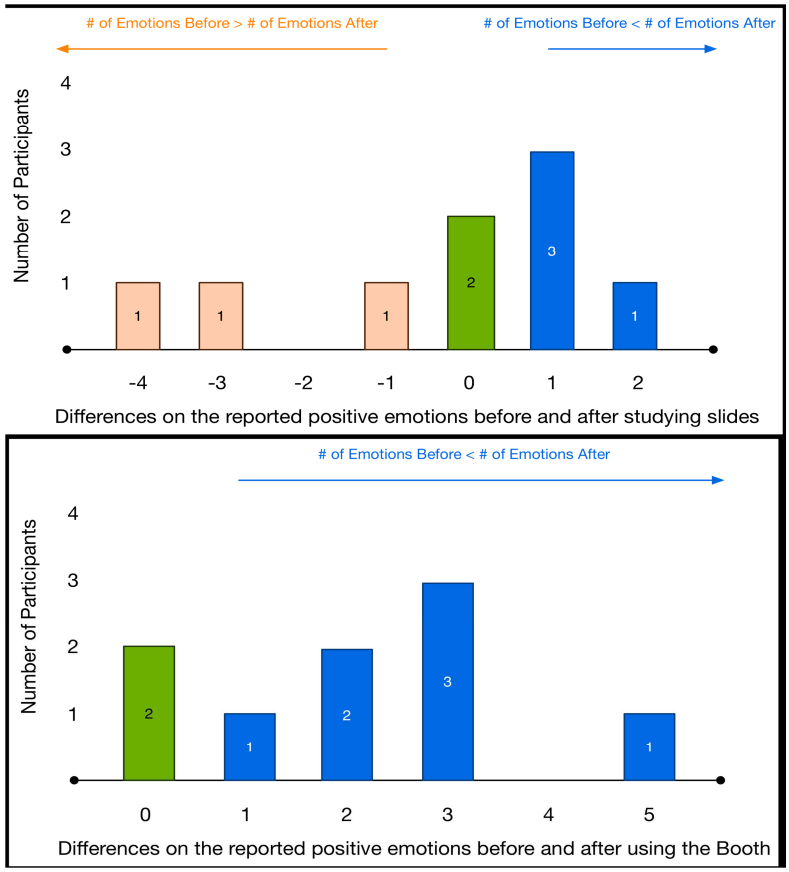

Figure 6: Top: the differences for the reported number of positive emotions grouped by the number of participants from the control group. Bottom: the differences for the reported number of positive emotions grouped by the number of participants from the treatment group.

5 Discussion

The first step of the study allowed us to give an answer to our research questions RQ1a and RQ1b. RQ1a refers to usability issues that could obstruct the use of *the Booth*. After conducting the tests for this first step we could discard the existence of significant usability issues with the current version of *the Booth.* Results from this step also show that the use of *the Booth* positively influenced the self-reported emotional state of participants, by reducing the reported negative emotions and increasing the reported positive ones. We acknowledge that there might be differences between the self-reported emotional state and actual emotional state of participant, thus we can not determine to which degree *the Booth* helped participants to improve

their emotional state. Regardless of this limitation, still consider that this study provides us with a satisfactory answer to RQ1b, which inquiries whether the use of *the Booth* has a positive effect in the emotional state of users.

The answers of these two research questions, allowed us to proceed to the second step of the study and explore whether the use of *the Booth* could help learners to acquire a more resourceful and powerful emotional state before a foreseeable stressful situation, such as giving a public presentation.

When looking at the self-reported emotions from the pre-questionnaires it is possible to find differences between participants from the two steps of the study. On the one hand during the first step of the study the most reported emotion was feeling neutral whereas feeling anxious was hardly reported. On the other hand during the second step of the study feeling anxious was one of the most reported emotions whereas feeling neutral was hardly reported. Nevertheless, results regarding the self-reported emotions after using *the Booth* remained similar for both steps of the study, showing through the self-report that the Booth stimulated many of the participants to feel energetic, enthusiastic, happy and joyful. This suggests that the intervention of *the Booth* works in normal conditions as well as in mildly stressful conditions that alter the regular emotional state of learners.

Results from this second step of the study also indicate that the use of *the Booth* results in a reduction of self-reported emotions that can hinder cognitive capabilities and academic performance such as anxiety, nervousness, and stress [Cassady, & Johnson, 2002]. When making a comparison between the self-reported emotions from participants who followed the common practice of studying their slides before their presentation, results show no indication that this practice has an influence in the self-reported emotional state of the participants. This is in contrast with the results obtained by the participants using *the Booth*, where participants reported a decrement in the amount of negative emotions and an increment the number of positive ones, such as joy, happiness, enthusiasm, etc. For the particular case of preparing for a presentation, this feature can be quite crucial since emotions are contagious and good presenters use their emotions to engage with the audience [Gallo, 2014].

From the extra comments made by the participants after their presentation, it is interesting to observe the general approval of using *the Booth*, and that one third of the participants mentioned how confident they felt during the presentation. It is worth noticing that additional comments are not necessarily findings, they provide us with insights but we cannot draw conclusions out of them.

RQ2 inquires whether the use of *the Booth* helps people to acquire a resourceful and powerful emotional state that allows them to perform well during a presentation. Results from this study provided us with a partial answer to this question. First we encounter similarities between the self-reported emotional states after using *the Booth* for both steps of the study, showing a significant increment in the reported positive emotions and a significant decrement of the negative ones. Second: when looking at the comparison of the self-reported emotions between the group that studied the slides and the group that used *the Booth,* results from the post-questionnaire revealed some differences. In the case of the negative emotions the group using *the Booth* reported having less negative emotions than the group studying the slides. This difference between groups displays a non-significant trend. In the case of the positive emotions the group using *the Booth* reported having more positive emotions than the group that

studied the slides. This observed difference between groups is marginally significant. The comparison of the self-reported emotions, before and after using *the Booth*, and the comparison between the self-reported emotions between the treatment and control group indicate that the use of *the Booth* helps to elicit a positive emotional state in users. Still this acquired emotional state only provides a partial answer to our RQ2. To give a full answer to this research question it is important to identify whether this acquired emotional and mental state leads to performing well as presenters. This point illustrates a limitation in our study. In order to determine whether participants performed well, it is required to have an objective method to measure the performance of the participants. There are rubrics [Schreiber et al. 2012] and questionnaires [Schneider et al. 2016] designed to measure the speaker's performance. However, there is a wide variety in public speaking experience among speakers. Hence, any measurable difference in the performance among them is likely to be attributed to their experience as speakers rather than to the intervention with *the Booth*. Obtaining the baseline level of performance for each of the participants would provide a solution to this challenge, by comparing their baseline against their performance after the treatment. Nonetheless, obtaining this baseline was not a feasible task to achieve for this study.

To gain some insights on the effects that the use *the Booth* has on the participants' performance, we inquired the self-satisfaction of participants regarding their presentation. The scores from the self-satisfaction questionnaire are fairly similar between participants that prepared with *the Booth* and participants that studied their slides, no noteworthy differences were observed between groups.

The amount of participants for this second step of the study presents another limitation. It allowed us to observed that the use of *the Booth* had a positive effect in the self-reported emotional state of the participants, nonetheless it did not allowed us to observe any effects regarding the use of *the Booth* and the level of self-satisfaction of the performed presentations. Moreover it does not allow us to determine if the emotional state induced by the use of *the Booth* helps users to perform well as presenters.

6 Conclusion and Future Work

In this study we evaluated a tool called *the Booth*, which is designed to help learners to prepare emotionally for expected stressful events and challenges. Results from the two-steps evaluation regarding the use of *the Booth* allow us to draw the following conclusions:

- Using *the Booth* resulted in an enjoyable experience for participants.
- As a standalone activity the use of *the Booth* showed to have a positive influence in the self-reported emotional state of users. In general interacting with *the Booth* helps users to feel more positive emotions, while decreasing the feeling of negative ones.
- *The Booth* has shown to have a positive impact in the self-reported emotional state of users even in emotionally charged situations, such as preparing for an oral presentation. Its use had a constructive effect on positive emotions

including confidence, powerfulness and enthusiasm, while reducing negative emotions such as anxiety, nervousness and stress.

As discussed in the previous section, in this study we could not observe whether the use of *the Booth* helps users to perform better on emotionally charged events. Therefore, as future work, we plan to continue this research and investigate the effects that the induced emotional state produced by *the Booth* has on learners' performance. In order to test this effect in performance, we anticipate the possibility to shift our focus, and do not limit our study to oral presentations. Oral and written examinations, negotiations, interviews, sports events, etc. also present good scenarios where we can study the effects in performance driven by the use of *the Booth*.

We currently suspect that the positive results obtained in this study can be explained by the presented psychological practices and techniques behind the exercises in combination with the novelty of *the Booth*. Therefore, to continue with the improvement of the *Booth*, we plan to design and develop new lectures. Instead of expanding in time, we plan to rotate the lectures, so that using *the Booth* remains fresh for recurrent learners while keeping it between three to eight minutes long. The purpose of these improvements is to study the reusability of *the Booth*, exploring the effects on the emotional states of users after multiple exposures to *the Booth*.

Events such as job interviews, negotiations, exams, presentations, etc. can have a big impact in the life of learners. Preparing for this type of events requires from learners to prepare content wise as well as to prepare a supportive mindset that will allow them to perform well during them. As shown in this study *the Booth* is able to help learners to obtain a powerful emotional state by reducing negative emotions and increasing the positive ones. A similar effect might be obtained with the use of different interventions that can be provided with different technological artifacts. Therefore the aim of this study is not to provide a unique solution designed to help learners to acquire a supportive mindset, the aim of the study is to show that interactive artifacts can support learners with this task with the hope to inspire new research on immersive applications designed to serve as the mindset preparation that helps learners to perform well.

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