

The Communication Center as a Transcendent Physical and Virtual Space

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Abstract

Practical solutions are needed to ensure that communication centers remain viable resources for the 21st century student (Nair, 2011). In order to preserve the communication center's status as a necessary campus space, and to increase its influence beyond a single physical location, technology must be employed as a means to enhance student communication skills. This paper proposes utilizing virtual reality, augmented reality, and wearable technology as solutions to common concerns facing communication centers as they seek to increase the public speaking and general multimodal communication skills of students. To guide the potential usage of the aforementioned technologies, and as a lens through which their effects can be better understood, cognitive theory of multimedia learning and digital literacy are applied here.

Keywords: virtual reality, augmented reality, wearable technology, public speaking apprehension

Universities have entered a period of unprecedented change (Katz, 1999), largely in response to (or anticipation of) the changing needs of students (Dahlstrom, Walker & Dziuban, 2013). As a vital component of universities and an essential resource for students (Nair, 2011), communication centers must employ technology with creative intentionality to increase both their reach and relevance. Thus, we propose practical solutions to common concerns facing communication centers (e.g., budget constraints, evolving and complex technologies, student busyness, lack of communication center participation) by positioning three specific technologies as a vision for what is next and as catalysts for best practices to assist the modern student. Specifically, this paper explores the potential of virtual reality (VR), augmented

reality (AR), and wearable technology as affordable and strategic resources for 21st century communication centers to increase both their reach and relevance. Just as Frisby (2017) has called for increasing technology usage within university classrooms, we propose that technologies can be also be utilized by communication centers as tools to improve speaking performance and reduce apprehension among college students.

This proposal suggests utilizing virtual reality, augmented reality, and wearable technologies as means to enhance the modern communication center, specifically in its efforts to assist students in preparation for presentations. Additionally, these technologies are poised to transcend the physical walls of the center, supplementing the longstanding mode of face-to-face

interaction, while simultaneously reaching more students with greater effectiveness. These technologies offer the potential to complement and augment the experience of students visiting communication centers. For instance, rather than merely observing and commenting on a public speech, consultants may employ wearable technology to monitor and graph the speaker's heart rate, analyzing patterns and noting points during which a student becomes physiologically aroused (Pörhölä, 2002). Additionally, VR and AR technologies provide communication centers with the ability to simulate numerous environments for students, more closely aligning practice and delivery (Klinger et al., 2005). Finally, these technologies are both portable and affordable, factors that combine to extend their use beyond the walls of the communication center. Considering the fact that communication centers exist to improve communication in various forms, we will first provide a warrant for the claim that college student "speeches" are often multimodal presentations.

Speech Performance as a Multimodal Communicative Act

Though the practice of public speaking traces its history to mere "oration" (Beebe & Beebe, 2012, p. 8), public speech delivery in the modern communication classroom is a multimodal event. With the advent of projection screens and PowerPoint, students are often expected to supplement their speeches with relevant text and visuals, clearly moving beyond the "age of verbal oratory" (Cyphert, 2004, p. 81). Thus, public speeches in the contemporary college classroom are frequently more than oral performances, and instead represent the essential components of multimodal

communication, sometime simultaneously. In fact, the most frequently taught technological skill in the basic communication course is training in presentation tools such as *PowerPoint* (Morreale, Worley, & Hugenberg, 2010). It is important to emphasize that the proliferation of multimodal presentations described above is only in reference to faceto-face classes. Though classes delivered inperson largely remain the default choice for most students, a significant and growing number of students elect to take some of their courses via an online delivery modality. In the fall of 2014, 28% of undergraduate students reported taking at least one class online (Allen & Seaman, 2016, p. 12). By its nature, the rapidly growing segment of online education is infused with multimodal presentations (on the part of both students and instructors) to a much higher degree. And lest one assume that the basic course, a course often featuring large amounts public speaking and a frequent focal point of communication centers, is immune from this trend, Valenzano, Wallace, and Morreale (2014) note that "numerous" instructors have delivered the basic course online (p. 363), and more than 30% of four-year universities reported utilizing online delivery for at least some of their sections of the basic course (Morreale, Myers, & Simonds, 2016).

While college classrooms have witnessed a dramatic shift toward multimodal communication in regard to speech performance, perhaps the clearest indicator of change is the variety of multimodal speaking contexts outside of the campus setting. With rapidly increasing regularity, individuals in a variety of personal and professional contexts are engaged in presentations that are

fundamentally multimodal. Technologies such as Skype, WebEx, and Zoom have capitalized upon the ubiquity of high-quality hardware and high-speed network connections, making video conferencing a staple of the modern workforce (Pierce, 2017). Furthermore, the national expansion and globalization of organizations has led to innovations such as constantly connected offices, where a pair of large screens, microphones, and video cameras can create a virtual and constantly connected portal between offices separated by thousands of miles (Pierce, 2017). Due to these environmental realities and the development of virtual and augmented reality, presentations will increasingly be delivered in fully immersive online spaces. If universities and communication centers continue to equip students only for the form of traditional public speaking vaguely reflective of the classroom environment, students will be ill-equipped for communicative modalities of the larger world.

Finally, it is prudent to recall that higher education was initially envisioned as something more than a means by which more skillful workers could be trained. Thelin (2004) writes of the early colonial colleges, noting that “The crucial ingredient, though, was that all learning ultimately was to coalesce into the values and actions of a Christian gentleman” (p. 24). Thus, early American higher-education possessed an inherent impetus for maturing the social (and even religious) proficiency of its students. If modern universities and communication centers hope to enhance the skill with which students navigate their life outside the walls of their future offices (increasingly saturated with video-streaming technologies such as Facebook Live, Snapchat, and Instagram Live), we must

expertly train their usage of communicative technologies. Failing to properly equip our students will mean their understanding of the aforementioned technologies will be informed exclusively by sources outside of the university context, a possibility that has implications not just for their personal lives, but their professional lives as well.

Thus, the modern conception of “public speaking” is thoroughly multimodal, and an essential component of student’s academic experience as well as their lives beyond academia that communication centers must be adequately prepared to address.

Communication Centers and Technology: A Brief History

Technology has not played a significant role in communication centers until recently (Apostel & Apostel, 2017). Even in our 21st century context many centers are hosted in empty classrooms and similar spaces with little or no technology, leading Anderson, Hearit, Morgan, and Natt (2015) to describe a typical communication center this way: “The lab itself is small and staffed by only two lab assistants ... The office itself is nondescript and has room for only two desks. It is not equipped with any type of technology (e.g., computer, projection system, recording capabilities.)” (p. 15). While this configuration may have been all that traditional public speaking classes needed—when visual tools might be created on poster boards or hand-drawn on chalkboards—today’s public speaker has more technology needs, and communication centers are beginning to respond. Anderson et al. (2015) note that

...the lack of computers acts as a barrier that prevents the lab staff and students from engaging in tasks like conducting research through the university's library system and editing outlines as they are discussed unless a student brings in an electronic copy of his/her outline on his/her computer.
(p. 16)

Add digital, projected, visual presentation aids to the mix, and the need for technology is clearly evident.

Recently, communication centers have begun to embrace communicative multimodalities (speaking, writing, and designing). When this occurs, technology is required, resulting in a greater need for audience feedback and intentionality. One of the first centers to combine high-quality feedback with multimodalities was the Center for Computer-Assisted Language Instruction (CCLI) at Michigan Technological University in 1985. This center embraced the need for feedback to such an extent that computers were placed in clusters instead of rows, so that people could easily share their monitors with peers (Apostel & Apostel, 2017). This model was widely promoted and was instrumental in the production of two other ground-breaking communication centers: Clemson's Studio for Student Communication in 2004—which incorporated a wide range of available technology—and, eventually, the Noel Studio for Academic Creativity at Eastern Kentucky University in 2010—which provided technology spaces designed for individual production, one-on-one consulting, and group work.

Enabled by the decreasing cost of technology, the aforementioned centers have blazed a trail for a new trend of communication centers that are becoming (or working closely with) “multiliteracy

centers.” “Multiliteracy Centers” are places that Sheridan (2010) says “can facilitate a professionally responsible approach to functional computer literacy” (p. 81). Since public speaking often requires some aspect of visual production (Cyphert, 2004) such as Prezi, PowerPoint, or informative video, multiliteracy centers can either work with communication centers to help provide visual communication feedback sessions, or, as more often the case, communication centers take what they are doing with visual communication feedback and learn to apply those skills to other digital products, like ePortfolios (Carpenter, Apostel, & Hyndman, 2012). It should also be noted that in addition to communication centers, many writing centers are also moving toward becoming multiliteracy centers as well (Trimbur, 2000.) If this trend continues, tomorrow's communication centers will be places filled with both established and emerging technology.

Theoretical Frameworks

Virtual reality, augmented reality, and wearable technology are emerging technologies that present clear opportunities for the enhancement of the modern communication center. While it is reasonable to believe that these technologies will support student visitations to the center, we also believe that these technologies will position students as active participants in the development of their own speeches (and even as critics of their peers). The simulation possibilities present a unique application of VR, AR, and wearables for the 21st century center. While it is true that the impact of these technologies on the center can be substantial, software and application use, without an appropriate theoretical framework, is cautioned. In order to support

theory-aligned application of these modern technologies, the following section positions two frameworks as appropriate lenses for application.

It is important for communication center scholars, as frontline student and academic services representatives, to navigate the use of technology in the center with an intentionality and delicacy. With that said, from a theoretical perspective, it is not enough to solely focus on the student or the teacher in a supportive classroom context. Instead, an appropriate lens for identifying a new wave of communication center education technology should build upon both a student and teacher perspective. While there are a seemingly unlimited amount of educational or instructional technology theories from which to view VR, AR, and wearable use in the communication center, this section will focus on two theories that present a workable framework for positioning the communication center as a transcendent physical and virtual space. While there are certainly other theories that reinforce student learning in the communication center, two theories stand out as foundational ideas for developing and building the communication center as a transcendent physical and virtual space. As such, this section will focus on the Cognitive Theory of Multimedia Learning and Digital Literacy as lenses for communication center scholars and practitioners to enhance the multimedia and digital presence of the campus communication center.

Cognitive Theory of Multimedia Learning

Multimedia learning is more complicated than this definition would assume, but it is primarily concerned with learning that occurs through the use of words and pictures (Mayer, 2014). For definitional

context, Mayer (2014) believes that words are text and explanatory in nature and pictures can be static (i.e. a still photo) or dynamic (i.e. video). Multimedia learning assumes, primarily, that deeper learning occurs when learners experience content in multiple modalities (Mayer, 2014). Ayres (2015), eloquently summarizes Mayer's (2014) three main principles for multimedia learning. He states:

Firstly, the information processing system has two channels for individual processing of visual/pictorial information. Secondly, each channel has limited processing capacity, and thirdly, active learning requires coordination of the cognitive processes (selecting and organizing relevant words and pictures into coherent representations and integrating them with prior knowledge). (Ayres, 2015, p. 631).

The Cognitive Theory of Multimedia Learning (CTML) underscores the importance, first, of "words as pictures" as vehicles of learning. Additionally, and for purposes expressed throughout this article, CTML assumes, rightly, that a student will experience deeper learning if multiple modalities are emphasized. Thus, a communication center can enhance student experience by integrating multiple modalities as vehicles for student learning and by partnering with classroom instructors to reinforce multimedia competencies learned in the communication classroom.

Digital Literacy

While the communication center is not a prototypical classroom environment, the center may enhance student learning, especially in relation to 21st century skills

and technologies. As such, a secondary theoretical framework that may be helpful for communication center scholars is digital literacy. To contextualize, this section will discuss the main tenants of digital literacy, and the practical integration of digital literacy in the modern communication center will be discussed in greater depth throughout the remainder of this manuscript.

In 1997, Gilster introduced the concept of digital literacy. For Gilster (1997), digital literacy is the ability of the user to comprehend and use digital source information. There were four primary pillars for Gilster (1997): internet searching, hypertext navigation, knowledge assembly, and content evaluation, but the specifics of those competencies were not initially developed. Bawden (2001), spoke in more concrete digital literacy skill terms and highlighted what these competencies allow an individual to do. Ultimately, a digitally literate user will be able to (a) retrieve and critically think about information; (b) publish and communicate information after accessing it; (c) recognize the value of traditional tools associated with networked media, (d) see social networks as sources of information and assistance; and (e) assemble knowledge by collecting reliable information from diverse sources (Bawden, 2001).

In 2013, The American Library Association Digital Literacy Task Force further defined digital literacy. For this organization, digital literacy is, primarily, the ability for one to use information and communication technologies to find, understand, evaluate, and even communicate digital information. This perspective emphasizes (a) cognitive and technical skill, (b) the appropriate use of diverse technologies to retrieve and judge information, (c) relationships among technology, learning, and privacy, and (d)

skill use to communicate, collaborate, and participate in society (The American Library Association Digital Literacy Task Force, 2013). Ultimately, digital literacy can be positioned as the skills necessary to navigate the digital world.

These two theories allow for a holistic view of student experiences in the communication center. If our desire is to reinforce communication content from the classroom, and present unique opportunities for additional academic services and instruction, then a multimedia learning framework helps to make sense of an applied approach to virtual and augmented reality and wearable use in the communication center. First, virtual and augmented reality are ingrained with multiple modalities that address student audio, visual, and digital needs. Wearable technologies also present an opportunity for multi-modal instruction through text and visual means. Second, communication centers would do well to explore digital skillsets in order to navigate the user experience functionality of VR, AR and wearable technologies. Technology, when used in virtual or augmented reality, must be used appropriately and efficiently. Communication centers can reinforce digital literacy already developed in the classroom and can encourage unique, center-specific initiatives that can go above and beyond the student's classroom experience.

Multimedia learning and digital literacy focus on the "user" (i.e. the student) with the end goal being competency development. In a VR world, users can find themselves in previously unimagined situations or can be transported, albeit virtually, to another time and place in order to experience this alternate reality. Wearables, as a bodily extension, allow users to monitor and assess data points and can be

used to supplement classroom content. These technologies are appropriate for the communication center but an effective application of multimedia learning and digital literacy concepts can enhance student use.

Taken together, these theories, cognitive theory of multimedia learning and digital literacy, present a unified perspective for effectively maximizing technology in the classroom through multiple modalities to create opportunities richer student experience.

Emerging Technologies for the Enhancement of Public Speaking

Technologies relevant to the improvement of public speaking skills continue to increase in both their capability and affordability (Hether, Martin, & Cole, 2017), making them doubly attractive options to enhance the appeal and efficacy of communication centers. Additionally, many of these devices are already in the possession of students (e.g. Apple Watch and VR capable phones), removing in many instances the factor of potentially prohibitive cost or prerequisite learning curve. Before further exploring the opportunities these technologies provide, a general introduction to them is warranted.

Wearable Technology

Wearable technology was a concept first clearly envisioned by Robert Hooke in the 17th century (as cited in Geary, 2002), when he pronounced:

The next care to be taken, in respect of the Senses, is a supplying of their infirmities with Instruments, and as it were, the adding of artificial Organs to the natural... and as Glasses have highly promoted our

seeing, so 'tis not improbable, but that there may be found many mechanical inventions to improve our other senses of hearing, smelling, tasting, and touching.
(p. 5)

It was over 300 years later when Thad Starner, after watching *The Terminator* in 1993, attempted to replicate the information-augmented sight of the film's antagonist. Tharner's prototype was named "Lizzy" and immediately became a component of his daily life (Miller & Spiegel, 2015). With "Lizzy" Tharner could record notes via a one-handed keyboard and recall the information via a small screen mounted over one eye (Miller & Spiegel, 2015). "Lizzy" ultimately culminated in Google Glass, a project on which Tharner served as Technical Lead/Manager (Stevens, 2013).

While Google Glass is one of the most famous (or perhaps, *infamous*) examples of wearable technology, other wearables far exceed the popularity of the limited-run Glass (Leslie, 2016). Smartwatches and fitness trackers are small devices, often worn on the user's wrists, that feature various sensors and provide differing degrees of visual and haptic (taps and vibrations) user interactions. Many of these devices offer the ability to detect, store, and transfer information for data such as heartrate, steps taken, and even Galvanic skin response ("UP4," 2017).

Augmented Reality

Unlike virtual reality, augmented reality seeks to supplement the sensory experience of the user's actual reality rather than replace it entirely. One of the most "discussed, maligned, and lauded" AR devices was the aforementioned Google Glass (Hether, Martin, & Cole, 2017). While

also classifiable as a wearable technology, one of Glass' key features was its ability to augment the visual experience of the wearer. Similar to Thad Starner's original "Lizzy," Google Glass overlays information onto the user's visual experience. Thus, while a user drives on a roadway, Glass can overlay virtual streets and street names (Horn, 2013). While impressive, compared to more recent advances in AR, Google Glass appears only rudimentary.

Among the most capable and powerful AR devices currently available is Microsoft's HoloLens. A head mounted, self-contained device using a translucent lens, the HoloLens projects realistic holograms into the user's field of view, providing an experience that Microsoft dubs, "Mixed Reality" ("Microsoft HoloLens," 2017). These holograms function as though they actually exist in the user's physical setting and can maintain a fixed position and orientation in the room, even as the user moves around them. Additionally, the HoloLens is outfitted with spatially sensitive speakers that allow a user to "hear" the hologram based on their position in relation to it ("Microsoft HoloLens," 2017).

Augmented reality is a technology that has already been introduced to a considerable portion of the public, thanks to the "Pokémon GO" phenomenon of 2016, when as many as 29 million users played the game, or roughly 15% of smartphone owning Americans (Frommer, 2017). Today, technology giants like Apple and Google are focusing considerable attention on augmented reality. Apple has already applied for at least one patent potentially linking AR capabilities and an upcoming iPhone (Kharpal, 2017; Gurman, 2017), and Google's recently announced "Lens" promises to unify many of their fragmented technologies bring impressive AR

capabilities to a host of Android and iOS devices (Pierce, 2017). As AR advances in its capabilities and its expansion into the larger marketplaces, so does its potential for application by communication centers.

Virtual Reality

While the above technologies show significant potential for incorporation in communication centers, Virtual Reality is perhaps the most promising. VR is a technology that presents the user with an alternative, computer simulated, reality. This alternative reality is often presented in the most engrossing way possible, seeking to overtake the user's perception of actual reality with virtual elements. VR, therefore, is a highly immersive and interactive experience. Virtual reality can be an artificial, computer-generated simulation of a three-dimensional domain, or the recreation of a real life environment through spherical (360-degree) video recordings ("Virtual reality vs. augmented reality," 2015).

VR systems typically employ head-worn devices with an embedded screen that replaces the user's perception of *actual* reality. While the primary mode of this reality is visual, many VR technologies also employ aural and haptic output. Additionally, handheld controllers and other peripherals may also be incorporated. Through these devices, a user can navigate and interact within this virtual territory in a nearly tangible fashion. Though it has existed in various forms for many years, virtual reality is only just beginning to make substantial forays into the larger market (Reisinger, 2015). Eighth generation gaming consoles such as the Sony PlayStation 4 as well as some modern smartphones like

Samsung's Galaxy devices have made VR technology increasingly accessible.

Virtual reality, as a platform for more realistic user experiences, has an unprecedented ability to transform student perceptions of communication centers. Industry leaders and digital pioneers from companies such as Google, Samsung, Sony and HTC (Crider, 2016) view the current age of technology as representing an unprecedented paradigm shift (Scoble & Israel, 2017). Specifically, technology leaders recognize the need for a deeper userinterface dynamic that will improve communication within the modern digital landscape. The immersive qualities of VR solve computer-mediated communication problems, enabling users to explore various options as means for finding a solution (Virtual Reality Concepts, 2017). Additionally, evidence shows that social norms of face to face interaction can be incorporated into VR (Takahashi, 2017), further demonstrating the suitability of the technology for communication centers. For these reasons and, specifically the technology's ability to change the way we experience events, Kopstein (2017) believes virtual reality is the most effective digital medium of its time. Access to VR technology within communication centers has the potential to significantly impact the experience of students as they prepare for speeches.

But what standards should be applied when assessing the necessary quality of this fast-changing and robust medium? According to Nosek (2015), a well-made virtual reality simulation must include the ability to track a user's motions, particularly their head and eye movements, and correspondingly adjust the images on the user's display to reflect the change in perspective. Currently, some

computergenerated VR can respond to a user's rotational and translational movements to demonstrate six degrees of freedom when moving within a space (Papaefthymiou, Plelis, Mavromatis & Papagiannakis, 2015). This sensation contributes to an authentic visual experience as it allows users to navigate within every plane of movement. Essentially, six degrees of freedom in VR will allow the scene to react to the complete input of the user, prompting the experience to become more interactive (Keating, 2015).

Ultimately, the immersive traits of VR allow for a user experience that builds a connection with the virtual world that is only built through physical dimensions currently. It is primarily for this reason that VR is technology holds significant promise for utilization by communication centers in their efforts to help students.

The Transcendent Communication Center and Public Speaking Proficiency

If increasing the public speaking proficiency of students is a core goal of the communication center, surely public speaking apprehension (PSA) is among the most significant obstacles to this goal. Each of the technologies described above have the potential to aid in the understanding of PSA in addition to serving as resources to help ameliorate the negative effects of PSA. Furthermore, the technologies presented above establish additional opportunities for the inclusion of multiple modalities in the communication center, thus reinforcing multimedia learning theory and present active and relevant opportunities for students to develop digital skills, ultimately enhancing digital literacy.

The first benefit these emerging technologies provide communication centers

is a deeper understanding and more concrete understanding of PSA. Since at least the 1950's, researchers have been using rudimentary technology (e.g. blood pressure cuffs) to measure what was once described as "stage fright" (Dickens and Parker, 1951). Today, advances in wearable technology capable of obtaining biometric data allow for greater ease of measurement, as well as maintaining higher levels of ecological validity. Though many wearables may not yield data that is trustworthy or useful to communication center consultants, some have demonstrated both reliability and precision in their ability to attain biometric data, demonstrating up to 99.9% measurement similarity with professional, hospital-grade equipment (El-Amrawy & Nouno, 2015). Ubiquitous wearables like the Apple Watch, for instance, could provide consultants in communication centers helpful biometric feedback without being prohibitively expensive or intrusive. Already, similar technologies are in use among researchers who have begun to analyze heart-rate patterns to identify how student's "arousal styles" can influence when and to what degree they experience PSA (Pörhölä, 2002).

A communication center utilizing wearable technology, for instance, could place an Apple Watch on a visiting student's wrist that was wirelessly paired to a nearby iPad via Bluetooth. Then, utilizing an app such as FITIV, the consultant could remotely monitor the heart-rate of the student via a "live stream" ("Can I live stream my heart rate from my Apple Watch to my iPhone?," 2017). Apps such as FITIV activate the Apple Watch "workout" mode, which allows it to monitor the user's heart-rate "continuously" ("Your heart rate. What it means, and where on the Apple Watch you'll find it," 2017), which equates to an average

measurement provided at approximately 10 second intervals. Not only can the speaker's heart-rate be monitored in real-time (a valuable indicator of PSA) and viewed as a graph within apps like FITIV, the measurements from the speech can also be exported to Microsoft Excel for more sophisticated analysis. These results can be analyzed by communication center consultants and students in order to develop a deeper awareness of the student's PSA, perhaps directly linking apprehension to certain moments or events in the delivery.

Once one shifts their focus from episodic to longitudinal implications for these technologies, their potential goes beyond understanding PSA to actually reducing it. Consultants, assuming they obtained consent, could track and store a student's heart-rate data across multiple speech practices at varying points in the semester (or various settings on campus), utilizing different interventions between the speaking events. Assuming acceptable control of variables, significant and highly relevant quantitative data could be leveraged in order to understand a student's specific PSA triggers and the most effective interventions. Additionally, helping students to utilize these tools and understand the data may provide meaningful improvements to their overall digital literacy.

Though wearables and AR are still in relatively nascent stages, VR has already seen several years of use as a means to facilitate exposure therapy, and has achieved significant results in reducing public speaking apprehension (Klinger, 2005; North, North, & Coble, 1998; Powers & Emmelkamp, 2007). Practice in a virtual environment allows speakers to respond accordingly to negative and positive audience feedback while at the same time eliminating the apprehension linked to

standing in front of a live audience (Slater, Pertaub, & Steed, 1999). The implications of this research for communication centers is clear. Rather than offering students a rehearsal environment that is most convenient for the center itself (which often translates to a private room with an audience of one consultant), centers could provide students with virtual environments similar to the one(s) in which they will ultimately present. This could mean adding virtual audience members to a real space through a technology like AR, or changing the space itself with VR. Speech preparation could be enriched in other ways through the use of these technologies by using AR devices to do things like providing additional information about audience members (that could be either true or fictional), so that a speaker could practice delivering a speech to audience members described in ways like, “skeptical,” “supportive,” or “apathetic.” For speakers still developing their ability to recognize the subtle nonverbal cues demonstrated by audience members, this type of augmentation could provide valuable practice for speaking to an attitudinally diverse audience. Beyond augmenting audience member attitudes, diverse descriptions of audience member’s cultural or ideological differences could be displayed for the speaker, identifying audience members in ways like, “Devout Muslim,” or “Non-native English Speaker.” These types of modification could increase the likelihood that a student visiting a communication center leaves with an ability to effectively communicate with a wide variety of listeners. Finally, the ability to modify a virtual environment in ways only limited by one’s imagination provides unprecedented opportunities for the application of CTML. As cues and modifications like those discussed above are

added and manipulated, communication center consultants must operate strategically and with a robust understanding of how the immersive multimedia environment they are generating will affect the students they assist. While hardware capable of generating these types of augmentations and simulations already exists, communication centers may need to initiate the development of software capable of effectively utilizing it.

In addition to some of the more nuanced possibilities for VR and AR, there are obvious and deeply practical opportunities as well. For instance, it has been observed that practice in front of an audience is the greatest predictor of the quality of a student's speech (Menzel & Carrell, 1994). Unfortunately, while this is an effective form of preparation, it poses at least two difficulties for students. First, practicing in front of an audience for those whose PSA stems from social concerns can itself be a daunting task. Even if there is no grade or formal evaluation, these students may neglect to practice in front of an audience because doing so triggers the same social apprehension they experience in the classroom (Turner, Beidel, & Townsley, 1992). Second, it can be difficult to arrange such practices, as doing so involves coordinating a time and location among several people. VR and AR are uniquely poised to address both of these concerns. First, while simulated environments can provide the exposure necessary to reduce apprehension in an actual public speaking context (Felnhofer et al, 2014), it is reasonable to assume that they are unlikely to trigger apprehensiveness to the same degree a live audience would, especially since the entire virtual setting, from the context to the number and mood of audience members is potentially modifiable (Slater,

Pertaub, Barker, & Clark, 2006). This allows students who may experience very high levels of apprehension in front of a live audience to practice exposure therapy in a much more gradual way.

While these technological applications transcend the material limits of the communication center's physical environment, it is important to note that these technologies can easily transcend the walls of a center as well, allowing consultants to provide simulated, augmented, and biometrically monitored speech delivery remotely via the internet. Whether by providing equipment to students, or utilizing equipment they may already own (such as smartwatches or VR capable phones), communication centers can disseminate software and lend their expertise from a distance, making them not just a physical hub, but a virtual one as well.

The opportunities described above provide a clear impetus for communication centers to strategically employ these technologies to reduce PSA and increase public speaking proficiency, all while extending their reach and relevance to the 21st century student. Furthermore, wearable technologies, AR, and VR provide the potential to aid students, not only in improving their college speech delivery, but also in helping them to hone speaking skills that are more easily transferred to the "real world."

Carpenter, Valley, Napier, and Apostel (2013) posit that communication centers should "immerse visitors in their own communication process" (p. 326); equipped with both tools and extant research, communication center consultants can provide such immersion to help students better understand and ameliorate the effects of their PSA, and ultimately improve their public speaking proficiency.

Conclusion

Higher education regularly undergoes a cyclical process: new technologies emerge and, sometimes hesitantly, are adopted. At times the implementation of new technologies is disjointed and lacking purpose. And yet there are instances, like our current context, where the available technology and salient needs collide to form a unique and necessary partnership. Informed by promising (though perhaps preliminary) research, communication centers should now begin to effectively utilize the devices already in the hands and on the wrists of their students. While this may initially mean utilizing hardware and software designed for fitness or video gaming instead of public speaking, valuable results can still be achieved, and these results can inform decisions to purchase or develop more powerful tools. For this possibility to become a reality, communication centers must strategically partner with instructors and students to engage in quality research, such as the longitudinal approach described above.

We believe that the emerging technologies described above can help to ensure the continued relevance of communication centers and significantly enhance their ability to develop the presentation skills of students. We have considered the implications and opportunities inherent in the adoption of virtual reality, augmented reality, and wearable technology - tools that support student feedback, campus collaboration, and communication center research. While it is true that communication centers are well positioned to institute new 21st century media platforms, creative and intentional theory-based application is a necessity for

success. Informed by theory and enhanced by technology, communication centers are poised to not only embrace the future of academia, but to shape it as well.

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