

Integrating Virtual Reality to Reduce Anxiety of Beginning Welders

Introduction

“Welding has been gaining importance since the Industrial Revolution began changing the world. The modern world demands the ability to meld metals when constructing most structures, creating a highly sought after trade skill” (White et al., 2010). *“Thanks to a global boom in industrial manufacturing, skilled welders are in greater demand than ever”* (Brat, 2006, p.1). With such a great need for these skilled laborers finding quicker and easier ways of training has become a must. The welding industry is facing a shortage of welders and one of the barriers that may exist is the anxiety or fear of welding that novices possess.

Virtual reality simulations have become a popular tool for training programs to increase the learning curve. Virtual reality simulations have been used to train surgeons, pilots, and now welders. Most studies have looked at the virtual reality training methods and integrating them into established welding programs (Stone et al., 2011). These studies have shown a positive effect on the trainees’ ability to learn the skills needed for their profession (Stone et al., 2011; Seymour et al., 2002).

However, one aspect that has not been evaluated is the cognitive obstacles that the trainees may face. Teaching students welding at the secondary and post-secondary levels can pose several obstacles to the students. One of the larger hurdles to overcome is performance anxiety when first learning a new skill (Hays, 2009). Finding a training method or technique to combat this barrier of anxiety is needed. Wallach et al. (2009) states that social phobia usually effects school performance, ability to create social networks as well as work performance. According to Powers and Emmelkamp (2008), virtual reality can have an impact on overcoming anxiety disorders. The next question that needs to be answered is: “Does the use of virtual reality help reduce anxiety in beginning welders?”

How it works

The VRTEX 360TM welding simulator is a computer based training apparatus used to train beginning welders prior to operating an actual welder. By placing the operator in a simulated environment prior to using an actual welder the participant will learn the basic welding psychomotor skills without the exposure to the potential hazards of welding. Some of the potential hazards that welders face include electrocution, getting burnt, ultraviolet radiation, toxic chemical fumes, and infrared radiation.

The utilization of a virtual reality welding simulator also creates a safer environment for the welder to practice and hone their skills. Some safety concerns for welders include the

exposure to welding fumes created by the welding process. The main pollutant in welding fumes that can cause death after prolonged exposure is carbon monoxide. The carbon monoxide pollutant can be “found in fumes of SMAW, GMAW, and FCAW” welding processes (Balchin and Castner, 1993, pp.160-161). With the virtual reality welding simulator there is no risk of exposure to these harmful fumes. By removing the physical risks out of the equation students are able to focus on learning the correct psychomotor skills without the fear of potential hazards.

Results to Date

The results to date thus far are purely anecdotal. Iowa State University purchased a VRTEX 360TM in 2011 and has been used in two agricultural mechanics classes: Methods of Teaching Agricultural Mechanics and Agricultural Mechanics Applications. Within these classes students have been instructed on how to weld with Shielded Metal Arc Welding (SMAW) and Gas Metal Arc Welding (GMAW) prior to entering the welding booth and have incorporated the use of the VRTEX 360TM into the training program.

Within these classes students have used the VRTEX 360TM during various times throughout the weld training process. Several students used the VRTEX 360TM before transitioning into the booth while others chose to use it after trying traditional training methods. Once the students had been acclimated to welding, they were asked how using the VRTEX 360TM effected their anxiety level during the training process. Several students stated that *“without it I wouldn’t have been comfortable trying it on the actual thing.”* Another student commented that *“it was hard trying to get used to the virtual reality simulation after being in the welding booth.”* It can be seen that the virtual reality simulation has an effect on anxiety, but to what level?

Future Plans

A research project has been developed at Iowa State University to measure the anxiety levels of novice welders. Students in the aforementioned classes will be asked to participate in this project. Students will be connected to a portable bioharness that measures blood pressure, respiration, perspiration, and pulse rate. The researchers will collect data to determine if the integration of virtual reality in our welding program has an effect on a welder’s anxiety level. The use of interviews and a daily journal will also be used to provide additional insight to the anxiety triggers in novice welders.

Resources Needed

The faculty in Agricultural Education department applied for and received funding from the University’s student technology fee grant to help purchase the VRTEX 360TM for \$45,489.00. Currently, funding sources are being sought to purchase the bioharness(es). Each bioharness costs approximately \$1600.00.

References

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