Short Communication

Virtual Reality Technology and Human Machine Interactions

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DESCRIPTION

Lack of training is a major cause of accidents that could easily be avoided at construction sites, and it is important to conduct training to minimize accidents at construction sites. Due to the limitations of training tools available, it was not possible to set up a real test site or reproduce a design scenario. This study aims to improve workers' safety awareness by developing an immersive, interactive, multiplayer-based training platform that incorporates Virtual Reality (VR) technology. The developed simulation platform acts as a training solution, enabling you to provide reproducible and flexible procedures in a secure environment. An assessment study was conducted to compare traditional training methods with the proposed VR solution. The promising result is that in the developed immersive environment, the implementation of VR technology allows people to experience dangerous situations without injuring themselves, so workers are better trained and better to remember important points. This study shows that the proposed VR platform endorsement can bring many benefits and not only be a useful tool for construction education, but also stimulate the study of human-machine interactions.

In general, the construction sector poses significant safety risks to workers, including the risk of death, due to many factors. In 2019, Australia suffered 183 deaths (1.4 per 100,000 workers), most of which were due to vehicle crashes, accounting for 43% of all injuries and deaths. Hitting a moving object or getting caught in a moving machine was the second most serious incident (11%), mainly involving the misconduct of workers and machine operators. In such an accident-prone environment, newcomers who are unaware of the dangers that can occur at the construction site or during work are at increased risk of health and accidents. It is important to train workers' safety awareness to ensure a safe working environment for all other construction workers and the smooth execution of construction work [1].

Human error is considered the leading cause of many injuries in the engineering community. In many unfortunate past cases, a worker can easily get injured due to lack of concentration and fall from a height, collide with a falling object, collide with a moving machine, or collide with someone while operating the machine. Lack of safety awareness is very likely to lead to obvious failures at the construction site [2]. Some workplaces maintain anonymous safety records of field workers that provide some insight into safety issues, but may not be applicable to other workplaces, and the safety log itself works. It does not directly or positively affect the consciousness of the members. Over the years, it has been recognized that training should play an important role, and various ideas for training solutions have been developed and implemented [3]. Based on a thorough examination of new technologies in training solutions, scientists find that engaging learning experiences are fundamental and best supported by adopting simulation technology and moving away from passive teaching methods and discovered.

Most training programs in live construction are verbal instructions combined with some video instructions. As the name of this type of training suggests, trainees are generally communicated and in the field without observing or experiencing the incident [4]. Feedback from industry experts suggested that the effectiveness of training depends on guidance from the training program and that good training should encourage workers to make safety-conscious decisions. The introduction of the latest information technology clearly facilitates efficient training. 360-degree video training is an exemplary way for a site's 360-degree to be delivered *via* a Head-Mounted Display (HMD) with sound effects that explain potential dangers. While these methods improve the training experience to some extent, the remaining challenge remains in the minds of new entrants, as the basic goal is to maintain long-term safety awareness that many traditional programs cannot achieve. It is to instill danger identification skills. One study emphasized that less involvement during safety training proved to be the main reason for its ineffectiveness in providing safety-related knowledge. Given that safety detection is based on people's subliminal perceptions of the current situation, workers simply perform or observe inadequate safety performance in construction projects instead of studying instructions, the theory. This means that providing workers with the opportunity to deal with real-world challenges can have a significant impact on workers' awareness of danger and can lead to training results that differ from traditional methods.

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CONCLUSION

Experimental data from several recent studies show that workers are learn more when they need to participate in interactive problem-solving and decision-making. Regarding hazard identification and risk awareness at construction sites, previous studies concluded that more hazards were correctly identified when participants participated in learning. Similarly, participation in training evaluated the impact of workers' risk perception performance and showed solid statistical significance between involvement, and risk perception. Information absorption has been displayed to be more effective with interactive training than with traditional video-based training. Studies have also revealed that people tend to make the right decisions in urgent situations. With the recent rapid development of computer science, Virtual Reality (VR) technology is maturing as an important interactive tool and is being applied to accelerate different areas of the engineering world. The immersive experience of VR allows people to interact with different virtual objects in different situations. VR technology has proven to be particularly useful for educational and training purposes.

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