ENHANCING THE CONSTRUCTION SAFETY TRAINING BY USING VIRTUAL ENVIRONMENTS: V-SAFE

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Outline

✓ Motivation
✓ Background
✓ Development of the V-SAFE
✓ Alpha Study
✓ Contributions
✓ Conclusion
Motivation

**United States**
800 fatal accidents in 2013 (U.S. Bureau of Labor, 2014)

**Canada**
558 fatal accidents between 2004 and 2013 (WSIB, 2013)

**European Union**
Approximately 3,800 fatal injuries occurred in 27 EU countries in 2012 (Eurostat, 2013).
Motivation

33% of Risks could not be identified by the workers

Carter and Smith (2006)

Coleman (1991)
Training Methods

Least Engaging
- Information Delivery Systems
- Books, Lectures
- Videos, Photos

Moderately Engaging
- Information Delivery Systems + Feedback
- Questionnaires
- Interviews

Highly Engaging
- Knowledge & Information Transfer
- Behavior Modeling
- Active Hands-On Training
- Feedback

"Relative effectiveness of worker safety and health training methods" by Burke et al. 2006
Research Objective

Alternative Training Method???

Knowledge and Information Transfer

Behavior Modeling

Active Hands-On Training

Feedback
Using Virtual Environments


“Using game technologies to improve the safety of construction plant operations” Guo et al. (2012) 3DVIA Virtools
Virtual Safety Analysis For Engineering applications (V-SAFE) is a virtual reality based safety training tool.

V-SAFE is based on the utilization of the Unreal Game Engine by virtue of the Unreal Software Development Kit.
V-SAFE: Features

- Crane Simulation
- Multiuser Interaction
- Surrounding Environment
- Collision Detection System
**Task:** Putting Up a Brick Wall

**Roles:** Crane Operator, Site Workers, Safety Engineer

**Goals:** Finishing the task without getting exposed to any accidents
V-SAFE

- Enhanced hazard identification
- Repeatable practical experience
- Spatial awareness
- Provision of the necessary collaboration between the users
- Knowledge transfer and interpretability of information
- Learning by doing approach
Contributions

V-SAFE

Risk-Free Repeatable Practice
Behavioral Modeling
Feedback

ISCS, Vancouver, 2015
Conclusion

- Safety management is a complex task in construction projects.

- Traditional learning methods fail to address the needs of the companies.

- This study fills the gap by recommending a highly engaging training method.

- Method could be beneficial to advance the effectiveness of the safety training.
Questions
Thanks!

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