Instructional Game Proposal

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# Problem Statement

[One in ten construction workers](http://blog.capterra.com/13-shocking-construction-injury-statistics/) is injured every year, with rates in Texas exceeding the national average. The most violated OHSA standard is fall protection. Ironworkers are particularly prone to injury. Last year, Millbrook Construction in Texas had a 22% rate of injury. Construction workers in the company with less than two years of experience were found to have a 55% injury rate, with the rate being much lower among more experienced workers. Millbrook seeks to reduce injury rates among its construction workers to under 5% for the upcoming year. Through a needs analysis, instructional designers have traced the cause of the problem to a few batches of rushed training in the previous year due to an unexpected increase in demand for blue collar workers in the state and in the construction industry in particular.

The instructional designers have recommended re-training for all construction workers with less than two years of experience. Because construction is such a dangerous job, Millbrook’s HR department, attorneys, and foremen have advised a form of training that does not further risk injury.

# Proposed Solution

I propose a game simulation with pre-loaded scenarios that cover the most common—and a few uncommon—situations that lead to workplace injury throughout the construction process.

Benefits of this solution:

* Simulated experiences of workplace injuries should increase learner retention of knowledge better than verbal warnings and text-heavy safety manuals.
* Being shown—not just told—how workplace injuries happen should increase intrinsic motivation to heed safety regulations.
* Players can also experience scenarios in which they must perform construction work while minimizing risk of injury to fellow workers.
* Being shown how failure to follow safe practices affects co-workers should increase intrinsic motivation to change behavior. Intrinsic motivators are [suggested by the International Risk Management Institute](https://www.irmi.com/articles/expert-commentary/employee-attitudes-and-accidents/) to be more effective than extrinsic motivators in changing attitudes and behaviors in regard to workplace safety.

# Technology Analysis

The chosen game engine for this project is Unity.

Reasons for using the Unity game engine:

* Can be used to develop three-dimensional environments.
* Graphics capacity can handle both simplistic and realistic representations of real-world objects.
* Allows for first-person player viewpoint.
* Has a large library of assets to speed up development time, including dozens related to construction.
* Physics engines allow for realistic effects in relation to gravity, collisions, and other forces.
* Allows for multiple players over a network.

Limitations of Unity:

* Requires C# programming language; UnityScript no longer supported as of August 2017.
* Requires Windows 7 or higher or macOS 10.9 or higher for development. No Linux support.
* Requires Windows XP SP2+, Mac OS X 10.9+, Ubuntu 12.04+, or SteamOS+ for gameplay.
* Requires a graphics card with DX9 (shader model 3.0) or DX11 with feature level 9.3 capabilities for both development and gameplay.

# Audience & Context Analysis

## General Demographic Information

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| --- | --- |
| Information Categories | Learner Characteristics |
| Age | 40 years old on average; recent hires average 32 years old ([EyeOnHousing](http://eyeonhousing.org/2017/06/age-of-construction-workers/)) |
| Sex | 91% male, 9% female ([BLS](https://www.bls.gov/cps/cpsaat18.htm)) |
| Health or Special Needs | workers required to handle lifting 50 lbs. of weight on a regular basis; |
| Ethnic/Cultural Background | White = 63.4 %, Hispanic = 28.9%, Black = 5.8%, Asian = 1.9% ([BLS](https://www.bls.gov/cps/cpsaat18.htm)) |
| Language | 86% fluent in English; 14% functional understanding of English |

## Academic/Educational Information

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| --- | --- |
| Information Categories | Learner Characteristics |
| Education completed | 1% bachelor’s degree, 6% associate’s degree, 70% high school diploma or GED, 23% incomplete education ([Sokanu](https://www.sokanu.com/careers/construction-worker/how-to-become/)) |
| Previous related training completed | 100% completed entry-level training with Millbrook |
| Reading levels | 8th grade reading level or higher |

## Specific Characteristics

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| --- | --- |
| Information Categories | Learner Characteristics |
| Entry Skills | Groups can perform all necessary job tasks to functional levels but is low on safety skills. |
| Previous or current knowledge of/experience with topic area | All learners have at least one year of construction experience, 21% had at least one occupational accident experience. ([International Journal of Occupational Hygiene](http://ijoh.tums.ac.ir/index.php/ijoh/article/viewFile/229/288)) |
| Attitudes toward content | Group has mixed attitudes toward safety. Education level, exercise, and prior accident experience were strongly correlated with occupational safety attitude. ([International Journal of Occupational Hygiene](http://ijoh.tums.ac.ir/index.php/ijoh/article/viewFile/229/288)) |
| Attitudes toward organization and training division | Group has neutral attitudes toward organization and toward training division. |
| Attitudes toward potential delivery system | Group reported preference for visual learning to oral lecture or text-heavy content. About half of group plays video games (mobile, PC, or console) for at least two hours per week. |

## Instructional Environment/Context

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| --- | --- |
| Information Categories | Learner Characteristics |
| Managerial supervisory support | Supervisor will be present during training. |
| Availability of needed technology (hardware, software, etc.) | Commercial client will provide access to computer lab that meets technology needs. |
| Physical aspects of site for implementation | Training environment will be computer lab with two dozen cubicles and workstations. |
| Relevance of skills to workplace | Safety practices and attitude change will directly impact rates of accidents and injuries. |

Comment: Based on this group’s characteristics, it is strongly recommended that the instructional solution be multimedia learning that is not text heavy and uses simple vocabulary, except for industry terms that all workers should know.

# Budget and Timeline

The advanced simulation will come to a total of two hours of training. It is estimated that it will take 716 hours to develop per hour of instruction, which would total 1,432 hours. This would be spread out over the course of nine to ten months, having factored in some tasks occurring simultaneously but also anticipating occasional delays in communication or problem solving. The average cost for such a project is $50,371 per hour of instruction, with a total of $100,742. (Estimates are based on [a thorough study conducted by the Chapman Alliance](http://www.chapmanalliance.com/howlong/).)