SERIOUS GAMES FOR LOW ENERGY BUILDING CONSTRUCTION WORKER TRAINING

Lauren Maher

Shaun Ferns, Matt Smith, Mark Keyes.
AIMS & OBJECTIVES

• Identify the effectiveness of serious games for construction workers.

• Compare the serious gaming approach to more traditional approaches.

• Explore opportunities /potential of serious games for teaching construction workers low energy training.
RESEARCH QUESTIONS

A) To what extent can upskilling training be delivered through the use of serious games rather than with traditional methods?

B) To what extent can attitudinal change take place through the use of serious games?
FES & QUALIBUILD

Build UP Skills Ireland Project (BUSI) undertook a skills gap analysis in relation to implementation of low energy buildings.

Key conclusions:

• Visible knowledge gap apposed to skills gap.

• Need for attitudinal change in the Irish construction industry.
1. List and identify common areas of air leakage
2. Principles of air tight & wind tight construction
3. Importance of air-tightness and wind-tightness
WHAT ARE SERIOUS GAMES?

• Computer and video games that entertain users while achieving primary goals of education and training.

• Similar to educational games focused on audience outside of primary & secondary education.
3 DOMAINS OF LEARNING

Larson, Miriam B, and Barbara B Lockee (2014)

FRAMEWORKS & METHODOLOGIES

Winn, (2008)


ADDIE MODEL

METHODOLOGY

1. Brainstorm Session
   Gather data from target audience.

2. Create Components
   Using Blender, create game components.

3. Create Prototype
   Using Unity, create 3D game.

4. Test Prototype
   Usability & functionality playtest.

5. Evaluate
   Make any changes/ refinements to game.

Repeat 3-5
Areas, concepts and skills that construction workers struggle most with are as follows;

- Continuity of insulation
- The effects of badly installed insulation
- Thermal bridging / effective airtightness
- Systems thinking
- Unit 3 of the QualiBuild Foundation Energy Skills Training Handbook.

Example Games

DRIVE Research Group
STORYBOARDING

We are having issues keeping heat inside the house. In winter we must have a fire and central heating on to heat the home. As you can imagine our heating bills are very high because of this.

That's common in older houses. Have a look at the house plans I have here. Tell me what you already know about the problematic areas and I can help fill in the rest.

Task One

Builder Explains how the window is made, what materials are used and about the importance of systems thinking.

How many of these window parts can you name?
HINT: Will tell you names which you can arrange.

Learn more...
PROTOTYPING TOOLS

Drawio

Twine

Fungus
PROTOTYPE DEVELOPMENT
CHARACTERS
Data Collected:
10 Participants
10 Surveys
10 Interviews

The results indicated that majority of participants in the usability testing session:

• Rarely looked at the instructions before, or even during gameplay.
• For the most part, listened and read along with the information being given to them by the pop-up builder.
• Realised after the first level that the information being taught to them, abled them to complete the task and move onto the next.
• Agreed and empathised with the ‘family characters’ located around the home.
The results indicated that majority of participants in the final testing session:

- Felt comfortable using the serious game.
- Felt they learned something from the game.
- Felt they enjoyed using the game to learn over traditional methods.
- Encouraged this new method of training construction workers.
- Encored attitudinal change regarding systems thinking and working with other trades.

Data Collected:
- 20 Participants
- 40 Surveys
- 10 Exit-Interviews
- Gameplay data collection application
# DATA COLLECTION

## Log index

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ANSWERING RESEARCH QUESTION 1

To what extent can upskilling training be delivered through the use of serious games rather than with traditional methods?
Research tools used to answer Research Question 1 were: the game, the questionnaires, and in-game data collection application and exit-interviews.

ANSWERING RESEARCH QUESTION 2

To what extent can attitudinal change take place through the use of serious games?
Research tools used to answer Research Question 2 were: the pre/post-game questionnaires, and exit-interviews.
THEMES

- New ways of learning
- Traditional Learning Methods
- Engagement
- Systems Thinking
- Technical ability concerns
- Age concerns
- Positive Feelings
- “Fun”
DATA ANALYSIS

I am aware that creating holes slightly bigger than needed around pipes, wires etc. affects the building standard. (Pre-Gameplay)

I am aware that creating holes slightly bigger than needed around pipes, wires etc. affects the building standard. (Post-Gameplay)

The idea of using a computer / game system makes me uncomfortable.

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I am aware that my quality of work affects other trade workers who work on the same building. (Pre-Gameplay)

I am aware that my quality of work affects other trade workers who work on the same building. (Post-Gameplay)

### TABLE OF GAME COMPLETION TIMES

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Thank You!