Using digital games to boost HF learning

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SUMMARY

This paper describes how an online game ('Control Panel') was used as part of Human Factors (HF) training to effectively introduce key concepts and engage participants. The game process will be explained and the results compared with available research. Finally, there will be some reflections from a practitioner on the impact the game has made in delivering HF training events.

KEYWORDS

Games, training, learning

Introduction

Using games for learning purposes is an approach that has attracted much attention and growth. Research has found that games-based interventions can (if designed well) achieve significantly enhanced student learning over non-game instructional methods (Clark et al., 2016). ***Control Panel*** is a team training game that involves participants playing a simple process task on their mobile phone. The primary purpose of the game is to introduce the delegates to the impact of Performance Influencing Factors (PIFs) on their performance. PIFs may be defined as the elements within the individual, task or environment which affect human behaviour. Often PIFs are accepted without question and their effect is not recognised, especially if increased demand on performance does not lead to obvious errors.

What does the Control Panel game involve?

Control Panel starts with a simple operating task to control the level in three vessels. In each round a new PIF is added to the game and impacts performance in a different way. After each round the facilitator displays the average group responses (response time; slips; omissions) on the screen for discussion.

Figure 1: Round 1 of ***Control Panel***

A practice and baseline assessment of the game is completed in which participants have to press the corresponding colour button as soon as a level indicator goes above the red line. The second round involves two of the colour buttons being switched around so they do not sit below the corresponding colour indicator. This results in a substantial increase in the average number of slips (pressing the wrong button). This fits in with the research by Reason & Takano (1999) who found that frequency bias (familiar behaviour patterns) was often identified (24.1%) as impacting human cognitive performance in nuclear and simulator incidents. One interesting finding is that in Round 3 (with the buttons still mixed up) the average number of slips drops off as new behaviour patterns are formed in the brain and people get use to the new arrangements. However, a messaging system that is introduced serves as a distraction and results in a large increase in omissions (the button not being pressed at all).

In round 4 there is a green level indicator introduced which gradually increases and participants have to press a reset button when it is between two red levels. If

the level gets to the end it counts as an omission. This is essentially a second sub-task which causes a huge increase in omissions. This is in line with Reason's (2002) work on omissions where he found that "where two similar steps are required to achieve a particular goal, it is the second of these two steps that is most likely to be neglected". This increase is enhanced by the lack of feedback (e.g. an alert) that the system gives on 'when' to press the 'reset' button. In addition, the 'response times' and 'slips' increase as the overall workload increases and combines with the poor design.

Case Study

The Control Panel game has been used in a number of Human Factors introductory training courses to show how PIFs can impact performance. It has generated discussion of specific PIFs such as distraction or poor Human-Machine Interface (HMI) design and it has also been used to discuss the quality of instructions. The statistics enable the participants to see how performance deteriorates with each round even if they aren't making any errors.

As the game requires the trainees to use a smartphone and have access to wifi, this has to be planned and communicated in advance. The game technology has proven to be very reliable. The game has provided many benefits:

- Trainees have all actively engaged with the game and have had fun when playing it. It has been used to provide an element of competition with prizes on occasion.
- It is a useful way of breaking up a training session with an activity which can be used to make many different learning points.
- It is a quick exercise to run, approx. 20 mins, which is critical within a full training schedule.
- Because of the technology, it has been used for both face to face and online training, which has been particularly useful during Covid restrictions.

Most importantly, the trainees remember playing the game which supports their learning. A trainee subsequently talked about what they learnt and particularly the 'button bashing game'!

Conclusion

Games can be a memorable and fun tool that help delegates explore and remember key lessons. The personal experience of playing the game demonstrates how PIFs impact every individual and emphasises that performance can be affected by the environment; it is not about people being poor performers. This personal experience cannot be achieved just by presenting the information. The Control Panel game results in increased awareness of the effects of PIFs and delegates benefit from the resulting discussions that it creates.

References

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