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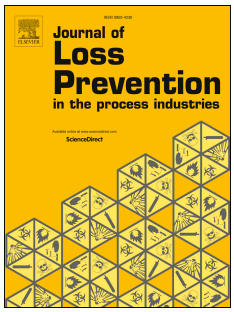

Developing a cross-disciplinary, scenario-based training approach integrated with eye tracking data collection to enhance situational awareness in offshore oil and gas operations

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Developing a cross-disciplinary, scenario-based training approach integrated with eye tracking data collection to enhance situational awareness in offshore oil and gas operations

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Abstract

Complexity in oil and gas operations is increasing day by day with the advent of sophisticated technology resulting in an enormous amount of information. The processing of this information continuously makes humans more vulnerable and prone to lapses and errors. In the wake of such complexity, the construct of situation awareness (SA) and risk perception becomes a core theme for human factors in the operation. Several attempts have been made to develop reliable and valid measures of SA, but the past studies were mainly focused either on self-rating techniques or questionnaire analysis. The reliability and validity of these techniques for real-time application are yet to be established in the petroleum industry. Having this in mind, the current study focuses on the development of a training infrastructure to address the technical and non-technical aspects of training in a holistic manner.

This paper presents a training framework based on scenario-based training in combination with different assessment and feedback techniques such as knowledge testing, risk literacy testing, eye-tracking data analysis, verbal response analysis, and questionnaire analysis. The framework comprises of four stages which can provide the participants a swift transition from their pre-training ability and knowledge to post training. To illustrate the working style of this training infrastructure, scenario descriptions are discussed which outlines different operational aspects of drilling. This can provide insight into the holistic approach needed to address the issues of high-reliability organizations (HROs) with improvement in the risk literacy and resilience of the candidates. In addition, the working methodology of eye-tracking analysis and its potential in the context of oil and gas operations training is explained using one of the scenarios constructed.

Furthermore, the scenario was executed in which tools and techniques outlined above were implemented. A thorough analysis of the data collected was conducted using statistical methods. It is worthy to note that different techniques especially ocular movement analysis showed a definite lack of situation awareness in novices compared to expert data.

Keywords: Training, Human Factors, Scenario Development, Item Response Theory, Eye Tracking Analysis, Situation Awareness, Risk Perception.

1. Introduction

Complex operations have witnessed several disasters over the past decades in which complicated and interdependent aspects enveloping the technical, human, and environmental issues are at the

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