Chapter 2
Theoretical Frameworks in ACTA

ABSTRACT

This chapter explores the foundational theories behind Applied Cognitive Task Analysis (ACTA), focusing on Cognitive Load Theory (CLT) and Situated Cognition. CLT is crucial for managing cognitive resources during learning and task execution by optimizing intrinsic, extraneous, and germane loads. This helps design effective instructional materials and training programs for better information processing and retention. Situated Cognition emphasizes the role of context and social interactions in learning, aligning with ACTA's focus on practical knowledge application in real-world settings. The chapter examines how these theories enhance understanding of cognitive processes and stress the need for personalized, context-rich learning experiences. By integrating qualitative insights, it highlights the value of capturing expert performance nuances often missed by quantitative methods. This theoretical foundation supports the application of ACTA across various fields, from education to industry, where improving cognitive performance is essential.

1.0 INTRODUCTION

In exploring the depths of Applied Cognitive Task Analysis (ACTA), it is crucial to understand the theoretical foundations that guide its methodologies and practices. ACTA, as a methodological tool, draws heavily from cognitive science to map out the thought processes and decision-making strategies of experts across various domains. These insights are essential for developing instructional designs and training programs that align cognitively with the complexities of real-world tasks. By

leveraging these frameworks, ACTA ensures that training and task analysis reflect the mental demands placed on individuals in high-stakes environments.

To achieve these outcomes, ACTA is built upon well-established cognitive theories that explain how individuals process, retain, and apply knowledge. This chapter delves into the cognitive theories that underpin ACTA's approach, offering a comprehensive understanding of the foundational concepts that enhance its application across diverse professional settings. Specifically, we will focus on two key theories—Cognitive Load Theory (CLT) and Situated Cognition—both of which play a pivotal role in shaping the principles and practices of ACTA, guiding how it captures and models complex cognitive tasks.

2.0 COGNITIVE THEORIES SUPPORTING ACTA

Applied Cognitive Task Analysis (ACTA) leverages cognitive theories to improve task performance and learning outcomes. By dissecting complex tasks into their cognitive components, ACTA helps to uncover the implicit knowledge that experts use to perform efficiently. These insights are then used to develop training programs and instructional designs that align with the way humans naturally think and learn. Understanding these theories provides a solid foundation for effectively applying ACTA across various professional domains. This section explores how Cognitive Load Theory (CLT) and Situated Cognition underpin ACTA methodologies, ensuring that tasks are structured to optimize cognitive resources and contextual understanding.

2.1 Cognitive Load Theory (CLT)

Cognitive Load Theory is central to understanding how ACTA enhances learning and performance by optimising the use of working memory. Developed by Sweller (2011), CLT posits that instructional designs must account for the cognitive load imposed on learners, balancing it to avoid overwhelming their limited working memory capacity. This balancing act is crucial in ACTA, where tasks often demand significant cognitive resources. In practical applications, such as nursing education, CLT principles help structure learning experiences to maximize the retention and application of knowledge in complex, high-stakes environments.

2.1.1 Key Types of Cognitive Load

Cognitive Load Theory differentiates between three types of cognitive load: intrinsic, extraneous, and germane load. Each of these plays a significant role in how ACTA practitioners design and analyse tasks.

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