Understanding Cognitive Artifacts: The Criticality of Multi-Method Study

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Abstract and Objective

Cognitive artifacts are evidence of user knowledge and information needs. Cognitive artifacts have embedded clues to how they support the cognitive work of users. Developers often convert frequently used cognitive artifacts to IT applications. Before development of these applications, the purpose, value, use, and meaning of the cognitive artifact must be fully understood. Absent this understanding, these applications may increase the cognitive load of healthcare practitioners (HCP), increasing patient safety risks. Multi-method study of cognitive artifacts promotes a thorough understanding of how they support working memory, cognition, and critical thinking. This poster describes the iterative value of multiple methods to gain a robust understanding of personal clinical cognitive artifacts (PCCAT) prepared and used by nurses.

Keywords:

Cognitive artifact, HER, System design, System analysis, Research methods

Introduction

Cognitive artifacts, which are external data representations of human knowledge, influence, and support user cognition. Cognitive artifacts maintain or operate on information, reduce the burden of working memory, support organization, aid recall, assist cognitive work, and guide decision making. The purpose, value, and use of the data recorded on a cognitive artifact may vary based on context, clinical practitioner role, and the point in the overall workflow that the practitioner interfaces with the cognitive artifact. The complex nature of cognitive artifacts justifies the need for multi-method study.

Methods

We propose this multi-method framework to understand cognitive artifacts based on our experience from a study of nurse PCCAT documents/artifacts. The multiple methods that resulted in this framework are 1) artifact/document analysis, 2) shadowing, 3) interviews, and 4) clinical scenarios. This process of data collection and analysis resulted in a comprehensive understanding of the purpose, use, and importance of the PCCAT to nursing practice.

Results

Multiple methods can contribute to the comprehensive understanding of a cognitive artifact. The iterative data collection and analysis processes of qualitative research are refined as new data is gathered. Iterative analysis informs project objectives. As each phase is analyzed, new questions and data clarification needs arise, resulting in modification of the next steps.

Analysis of multiple PCCAT documents provided rich insights and understanding of the knowledge representation domain. Coding generated new questions that were included in subsequent phases of data collection. PCCAT analysis resulted in a taxonomy of the knowledge representation we call a PCCAT.

Shadowing nurses disclosed the multiple resources and locations consulted during PCCAT preparation. Shadowing enabled dialogue with the nurse regarding the information reviewed and resulting decisions or actions. The role of the PCCAT in the plan of care emerged as the nurse was observed using the PCCAT for data recall and visualization, reflection, and organization, and a temporary documentation repository. Shadowing allowed triangulation of much of the information obtained during document analysis.

Interviews enabled the nurse to reflect and reflexively share how, when, where, and why he/she uses the PCCAT. Poignant personal experiences related about using the PCCAT expanded our understanding of how the PCCAT supports cognitive work.

Clinical scenarios allowed validation of the data and the themes generated through analysis of the previous phases. The scenarios incorporated the understanding and perceptions developed from analysis of the previous three phases of the framework, representing a capstone of the research, affording summarization, review, and confirmation of the information gained from the previous phases.

Conclusion

Multi-method study of cognitive artifacts is a robust approach to gain a deep and contextual understanding of the purpose, meaning, use, and importance of cognitive artifacts.

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