Research Methodology

The proposed work aims at describing the development and assessment & evaluation of a methodology for pragmatically studying the behavior of expert and novice object-oriented (OO) designers. The methodology consists of two parts: The principles related to the experimental set up and experimental task; and an encoding scheme, support software and detailed instructions for data collection and analysis.

The important aspect of the approach is the encoding scheme and its associated rules for identification, interpretation and analysis of results. The scheme would objectively be designed in such a way that it can measure over twenty different variables, many of which have five or more levels, covering the following core facets of object-oriented analysis and design:

i. The cognitive activities of notion & abstraction, psychological reproduction and problem representation

ii. Top-down and Bottom-up design approaches as design strategies; and

iii. Results based on Design outcomes based on the metrics completeness, correctness and extensibility of design stage.

The expected result shall be based on an experiment developed and analyzed according to the principles and encoding scheme of the methodology, which will include:

(1) Assessment of the cognitive activities of mental simulation at varying levels of abstraction in both design groups, for supporting the hypothesis that mental simulation is as prevalent during design as implementation.

(2) In terms of design strategies, despite OO providing mechanisms to facilitate extensibility and generality verification of generalization in the early stages of design.

(3) Computing and evaluating Completeness and correctness scores

Validation of the methodology, in order to find out the level of success of the proposed work, shall be done in a number of ways:
Firstly, the approach shall be derived from, and compared to, a critical analysis of existing work.

Secondly, objectivity and reproducibility of the encoding scheme are to be verified by a high level of inter-scorer agreement with an independent expert.

Thirdly, a pragmatic study based on the methodology, involving some of expert and some novice developers, shall also be conducted and analyzed, with the majority of the observed factors comparing favorably with previous work, and in line with my expectations and assumptions.

Finally, the potential application of the methodology to previous work, are also proposed to be explored in order to provide an initial demonstration of generality.

These outcomes shall be examined, analyzed and interpreted. With regard to OOA/D, a designer’s mental model is expected to be a considerable and complex entity that is likely to encompass at least the following elements:

- A structured internal (mental) representation of the entities and their relations in the problem space.
- OO concepts and rules, and domain concepts and rules in the context that they are applied to the problem space.
- Concepts and rules related to specific OO tools and technologies used for the implementation of a solution.