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Evaluating the use of EiPE and the Development of a Domain-Specific Language for the Novice Programmer

Supervisor: Associate Professor Raymond Lister

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Author: Thomas A. Pelchen

Abstract

The purpose of this paper is to identify whether the language used by a novice when responding to an Explain in Plain English question can be used to identify their current transition to the expert. This paper will involve the analysis of the results and responses from a cohort that undertook their final examination for an introductory programming subject (CS1).

When the responses to the Explain in Plain English questions have been categorised to the SOLO taxonomy and given a mark accordingly, prior research has shown that the transition of a novice to the expert is evident by said mark. This paper presents an alternate way the Explain in Plain English questions can be used to identify the transition of the novice: that the transition is evident through the language used by the novice in their response.

This paper also addresses the concerns educators may have over the suitability of the Explain in Plain English question as an examination method. Firstly, by showing that as the marks received for the Explain in Plain English will correlate to marks for the traditional examination methods; that when included, the Explain in Plain English questions will not skew the marks of the cohort. Secondly, by showing that the ability to answer an Explain in Plain English question is not dependent on the English language proficiency of the student; educators can be assured that level of English language proficiency required to answer these questions is no greater than what was required for admission into their course.

This paper confirms the findings of previous research regarding the relationship between tracing, reading and writing code. That a skill in tracing is a pre-requisite to the abilities of reading and writing code, a relationship that is more apparent through nonparametric tests. It also extends these findings by using both a larger test population (in a single institution) and providing a Phi-coefficient value for identifying the direction of this relationship, a statistic missing in the previous tests.

To identify whether the language used within the answers to the Explain in Plain English questions can be used to identify a novice's current transition to the expert programmer, this paper considered two possible indicators: (1) The first unsuccessfully looked at direct and indirect tautological reference of the question in the words of the answers, finding that a tautological response is not apparent in the responses of this cohort; (2) The second found strong evidence within the responses for a domain-specific language. The use of this domain-specific language correlated strongly with the total mark received for the Explain in Plain English questions; a mark which prior research has shown to be an indication of the current transition of a novice.

The paper concludes with the discussion of ways to further explore the findings of this paper, noting the possible benefits that the analysis of the domain-specific language used by a novice may bring.

CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Submission of Final Thesis:

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Ethics Clearance

Human Negligible Low Risk Ethical clearance was granted for this project by the University of Technology Sydney Human Research Ethics Committee under approval numbers ETH16-0340.

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~ Thomas Albert Pelchen

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