

Evaluating the Effectiveness of Scaffolding Problem Based Learning to Teach Software Design Patterns

Daniel Tucker P104960 | BSc Web Development | dtucker.104960@student.uwtsd.ac.uk | Mount Pleasant Campus, Swansea, SA1 6ED

Introduction

Software Design patterns follow a set of design principles and are tried and tested techniques that offer best practises in the software development industry [1]. Software design patterns have become an essential component within the education curriculum[2], however, students are unable to apply the skills learnt when they head into industry. This project extends the research of Mike Dacey to evaluate the effectiveness of using Scaffolding Problem Based Learning to teach students software design patterns.

Aims and Objectives

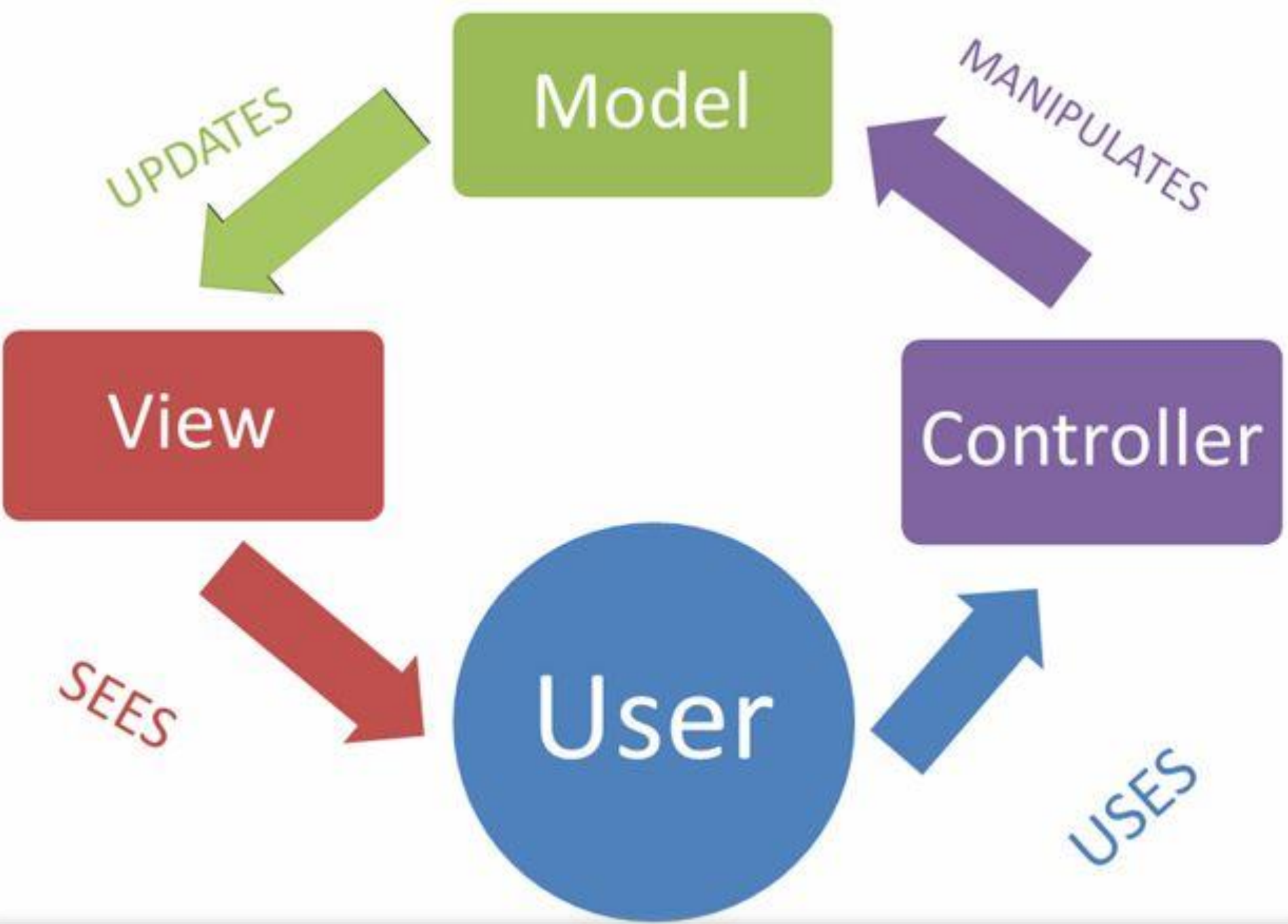
- Aim**

Evaluate the effectiveness of teaching software design patterns by developing a PHP framework as a learning environment.
- Objectives**
 - ❖ Analyse the most common and popular PHP frameworks used today and identify common features between them.
 - ❖ Evaluate an approach to teaching, using a PHP framework and design patterns by designing and building a PHP learning environment.
 - ❖ Conduct a study using a focus group, and analyse the results to determine the effectiveness of the framework and the teaching approach.

Pedagogical Approaches

Problem Based Learning (PBL) is a student centred teaching approach that has the problem as the main driving force, however it can leave gaps in students knowledge[3]. Based on Vygotsky’s framework [4], Scaffolding Based Learning uses scaffolds to help students complete exercises they might not complete independently [5].

Design and Implementation



- ❖ Model – View – Controller Architectural Pattern
- ❖ Front Controller Pattern
- ❖ Application Controller
- ❖ Command Design Pattern
- ❖ Registry
- ❖ Object Relational Mapper
 - ❖ Domain Model
 - ❖ Data Mapper Pattern
 - ❖ Observer Pattern for Testing

Results

- ❖ The teaching approach helps students understand the importance of solving problems in programming.
- ❖ Students like building their own solutions to learn new technologies.
- ❖ Hints helped students to complete tasks and think about the solution differently.
- ❖ Students needed extra scaffolding on the more difficult exercises.
- ❖ The teaching approach increases interaction between the students and facilitator.
- ❖ Hyperlinks helped students to follow the example code more easily.

Conclusion

After researching PHP frameworks and software design patterns, a framework supplied by Mike Dacey was extended by the author to teach students software design patterns. Based on the results, Problem Based Learning (PBL) is not as effective other studies conclude. The main findings of this project conclude that Scaffolding Problem Based Learning is a very effective approach, however, in this project, extra background information is needed.

References:

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