Scientific Methods, Assignment 2

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Introduction

This is our hand-in for assignment 2.

1 Question 1

This section contains our answers to question 1 of the exercise.

"**Which research design would you choose for the topic? And Why?**
"

We would adopt a pragmatic philosophical worldview. This approach would help in providing us with a more comprehensive understanding of the efficiency of TDD. We find it especially important in this context as we find getting quantitative data paramount for examining the efficiency, but it seems plausible that the efficiency is dependent on some developer experience. Therefore examning both should yield a more convincing result. However, it should be noted that this approach is more complex and time-consuming.

Our proposed approach would involve a combination of qualitative and quantitative methods. We would use a qualitative approach to refine the definition of efficiency within the context of developers. This would be accomplished through interviews with individual developers. This aligns with a constructivist worldview and serves as the initial phase of an exploratory sequential inquiry.

Once we have gained a proper understanding of the context, we would proceed to test the developers. This phase would also incorporate a mixed approach.

In a controlled environment, we would quantitatively test TDD compared to TLD using key performance indicators. Concurrently, we would conduct interviews to determine if the developers' real-world experiences align with the findings. This process would reveal whether the controlled tests align with the developers' perceived efficiency of TDD compared to TLD. It would be beneficial to conduct these tests and interviews while considering the developers' environment and experience.

This strategy of inquiry, which combines controlled tests and interviews, is known as convergent parallel as it aims to assess whether the results converge or diverge.

2 Question 2

This section contains our answer for question 2 of the exercise.

"**How would you formulate the research questions/hypotheses?** "

We would formulate our research question in the following way.

"**What is the impact of Test-Driven Development (TDD) compared to Test-Last Development (TLD) on the efficiency of software development?** "

- Sub-question 1: *What is the impact of Test-Driven Development (TDD) compared to Test-Last Development (TLD) on the time required to complete coding tasks and the accuracy of task completion?*
- Sub-question 2: *How do experts perceive the impact of Test-Driven Development (TDD) compared to Test-Last Development (TLD) on the efficiency of software development?*

Following this we have formulated our hypotheses.

- Directional hypothesis: *Test-Driven Development (TDD) will result in a shorter time required to complete coding tasks and a higher accuracy of task completion compared to Test-Last Development (TLD).*
- Null hypothesis: *Test-Driven Development (TDD) will not affect the time to complete coding tasks and the accuracy of task completion compared to Test-Last Development (TLD).*

We have identified some additional questions below.

Qualitative

- Description and Classification: How can we measure the efficiency for software development?
- Descriptive - Comparative: How do practitioners perceive the efficiency of development with TDD in comparison to TLD?

Quantitative

- Correlation: Does use of TDD correlate with the efficiency of software development?
- Causality / Comparative: Does TDD better facilitate efficiency of software development than TLD?

3 Question 3

This section contains our answer for question 3 of the exercise.

"**Which research method would you choose to address the research question?** "

For the research question and sub-question 1, we would choose an experimental research method. This would involve conducting controlled tests to compare the impact of Test-Driven Development (TDD) and Test-Last Development (TLD) on the time required to complete coding tasks and the accuracy of task completion. This method would allow us to gather quantitative data and analyze the statistical significance of the results to definitively show the task completion times and accuracy of task completion.

Experimental research method

- Conduct controlled tests
- Compare TDD and TLD
- Measure time required to complete coding tasks
- Measure accuracy of task completion
- Gather quantitative data
- Analyze statistical significance of results

For sub-question 2, we would choose a qualitative survey research method. This would involve conducting interviews with experts to understand their perceptions of the impact of TDD and TLD on coding tasks and task completion. This method would allow us to gather in-depth insights and subjective opinions from the experts. We want to use this to confirm our quantitative measurements and see if the answers we get from the survey suggests the same effect.

Qualitative survey research method

- Conduct interviews with experts
- Understand perceptions of TDD and TLD
- Gather in-depth insights
- Obtain subjective opinions from experts

By combining these two research methods, we can obtain a comprehensive understanding of the research question and address both quantitative and qualitative aspects of the topic. This does not qualify as either **Design Research** or **Action research**, as we would only study the effects of an already created method and not create our own.