

Study Design

This mixed methods between-group study will consist of 4 research groups attempting to solve up to two programming assignment prompts with differing levels of supportive materials and tools to determine the effectiveness of said material and tools. Individual participants will be assigned to a development team consisting of three to four Computer Science/Software Engineering students in one of these four research groups.

The study will consist of seven individual stages; however, not all research groups will participate in all seven stages and each study condition may have a modified task during each stage.

Stage 1: Mob Programming Tutorial

During Stage 1, each team in each research group will be presented with a different amount of information from our beginner Mob Programming tutorial.

- **Group A (Control):** Teams in **Group A** will not be presented with any Mob Programming tutorial information and will only be asked to perform a simple team ice breaker.
- **Group B (+ Tutorial):** Teams in **Group B** will be presented with a printed copy of our beginner Mob Programming tutorial and will be asked to perform a simple team ice breaker.
- **Group C (+ Facilitation) and Group D (+ Personalization):** Teams in **Group C** or **Group D** will be given an introductory handout describing the initial use of our Mob Programming tool and will be asked to perform a simple team ice breaker. Then, the groups will be presented with our beginner Mob Programming tutorial through our tool.

Stage 2: Programming Prompt A

During Stage 2, each team in each research group will be presented with *Programming Prompt A* and will be asked to read through it.

Stage 3: Programming Session A

During Stage 3, each team in each research group will attempt to complete the provided *Programming Prompt A* using any materials and/or tools they received.

- **Group A (Control):** Teams in **Group A** will be asked to attempt *Programming Prompt A* using any collaboration method with no supplemental material or tool access provided.
- **Group B (+ Tutorial):** Teams in **Group B** will be asked to attempt *Programming Prompt A* while Mob Programming as described by the information in their printed beginner Mob Programming tutorial.
- **Group C (+ Facilitation) and Group D (+ Personalization):** Teams in **Group C** or **Group D** will be asked to attempt *Programming Prompt A* while Mob Programming as described and facilitated by our tool.

Stage 4: Survey

During Stage 4, each participant will be asked to complete a short survey depending on which research group they were a part of. Some research groups will only complete some of the survey sections.

- **Group A (Control):** Participants in **Group A** will be asked to complete part A of the survey.
- **Group B (+ Tutorial):** Participants in **Group B** will be asked to complete parts A and B of the survey.
- **Group C (+ Facilitation) and Group D (+ Personalization):** Participants in **Group C** or **Group D** will be asked to complete parts A, B, and C of the survey.

After Stage 4, participants in **Group A** or **Group B** will be dismissed.

Stage 5: Programming Prompt B

During Stage 5, each team in **Group C** and **Group D** will be presented with *Programming Prompt B* and will be asked to read through it.

Stage 6: Programming Session B

During Stage 6, each team in each research group will attempt to complete the provided *Programming Prompt B* using any materials and/or tools they received.

- **Group C (+ Facilitation)**: Teams in **Group C** will be asked to attempt *Programming Prompt B* while Mob Programming with the same material and tool access as in Stage 3.
- **Group D (+ Personalization)**: Teams in **Group D** will be asked to attempt *Programming Prompt B* while Mob Programming with the same material and tool access as in Stage 3. However, the settings of the facilitation tool will be personalized for each group based on the suggestions of our AI model.

Stage 7: Survey

During Stage 7, each remaining participant will be asked to complete a short survey depending on which research group they were a part of. Some research groups will only complete some of the survey sections.

- **Group C (+ Facilitation)**: Participants in **Group C** will be asked to complete parts A, B, C, and D of the survey.
- **Group D (+ Personalization)**: Participants in **Group D** will be asked to complete parts A, B, C, D, and E of the survey.

After Stage 7, participants in **Group C** or **Group D** will be dismissed.

Study Design Diagram

