Research Status Update - 2024/1

Jefferson G. M. Lopes

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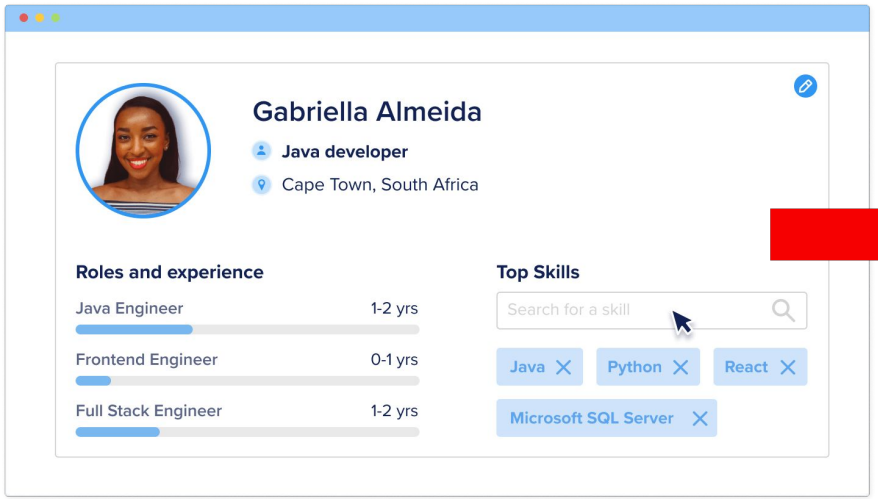
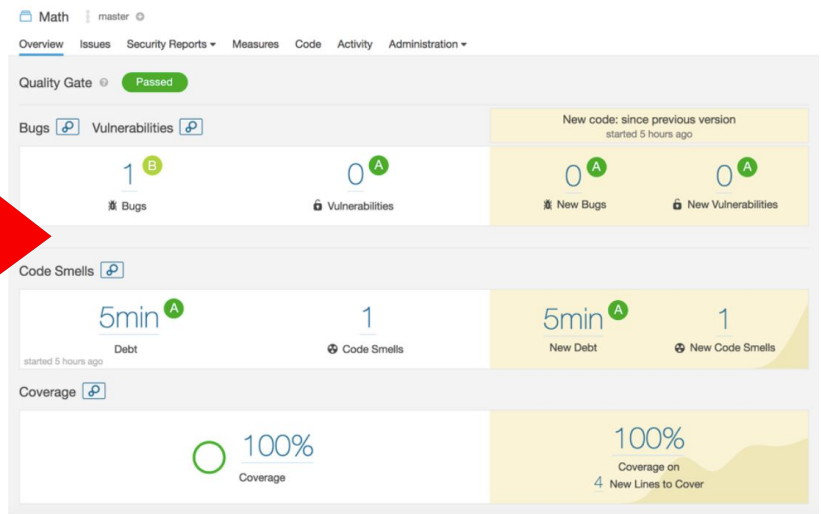
Research Topic

- Investigation:
  - Developer's auto declared skills match their code quality?





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Research Topic

- RQ1: Is there a convergence between self-declared skills and software quality metrics?

- RQ2: Is there a metric, or a set of metrics, that best represents self-declared skills?

Research Topic

- What is the current consensus of the literature about those kind of metrics?
- We need a foundational work to build upon.
- The initial bibliographical research turned into a systematic literature review;

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Evaluating the Impact of Developer Experience on Code Quality: A Systematic Literature Review

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Context

- An increased developer's experience is usually associated with better work performance, specially code quality (common sense);

- What the existing research tells us about this?
  - Often there are contradictory results: code quality sometimes is directly correlated with a developer's experience and sometimes it is inversely correlated!

Context

- This systematic literature review aims to better understand the academia results about the relationship of Code Quality and a developer's Experience.

- But what is Code Quality? And Experience?
  - It is needed to define this concepts as well.

Context

- Research Questions:
  - RQ1: How is developer experience evaluated in the context of software engineering?
  - RQ2: What metrics or methods are used to evaluate software quality?
  - RQ3: How does developer experience relates to code quality?

Study Design

- Search string (derived from pilot study):

(developer* AND (experience OR “years of experience” OR “programming experience” OR “career experience”)) AND (“code quality” OR defect* OR “technical debt” OR bug* OR “code smell*”)

Study Design

- Inclusion and exclusion criteria:

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Papers published in Computer Science.	Grey literature.
Papers written in English.	Papers published before 2000.
Papers that investigate the relationship between developer's experience and code quality.	Purely theoretical papers.

Study Design

- Databases:
  - ACM Digital Library;
  - IEEE Xplore;
  - Scopus;
  - Web of Science;

Data Extraction Results

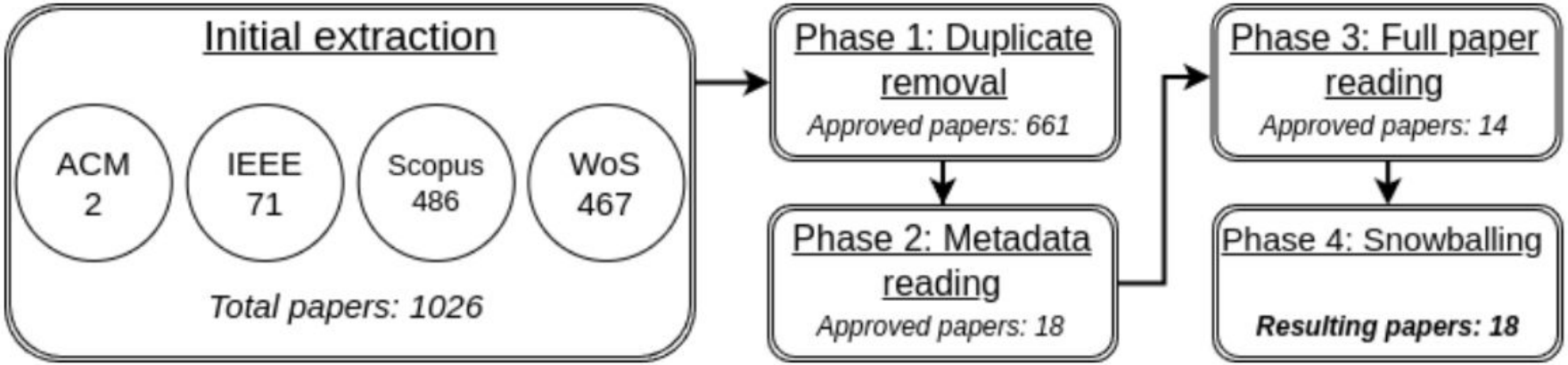
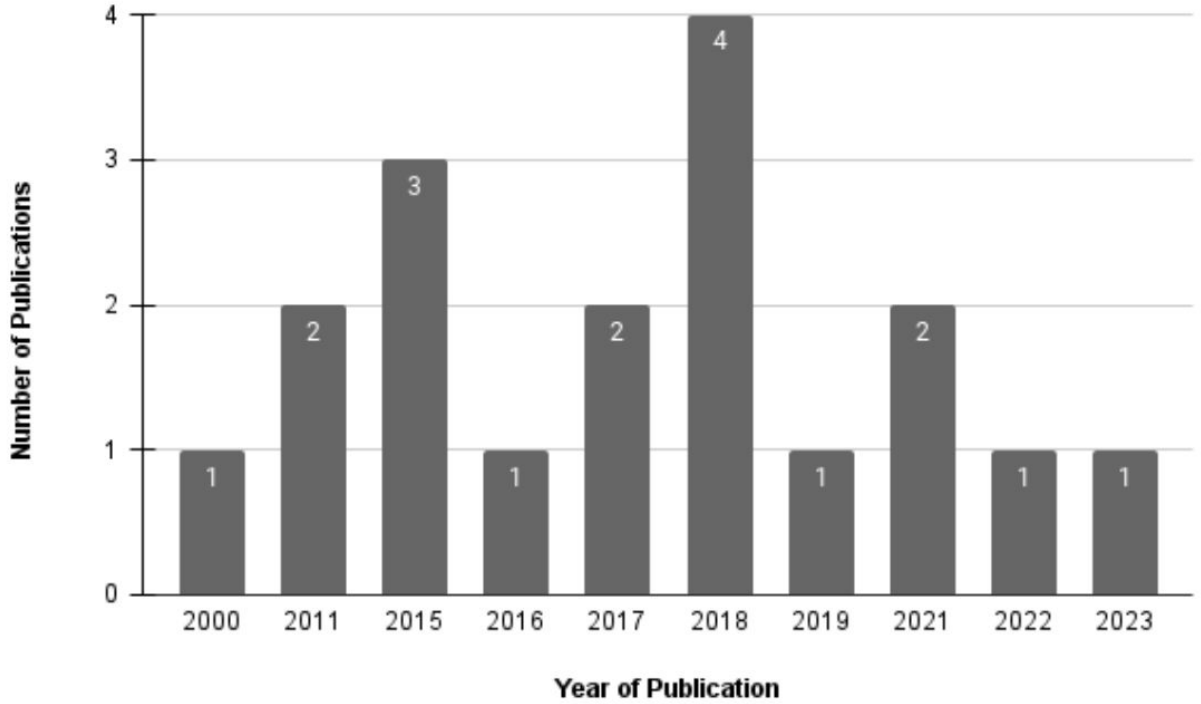


Figure 1. Paper selection and extraction

Data Extraction Results



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RQ1: How is developer experience evaluated in the context of software engineering?

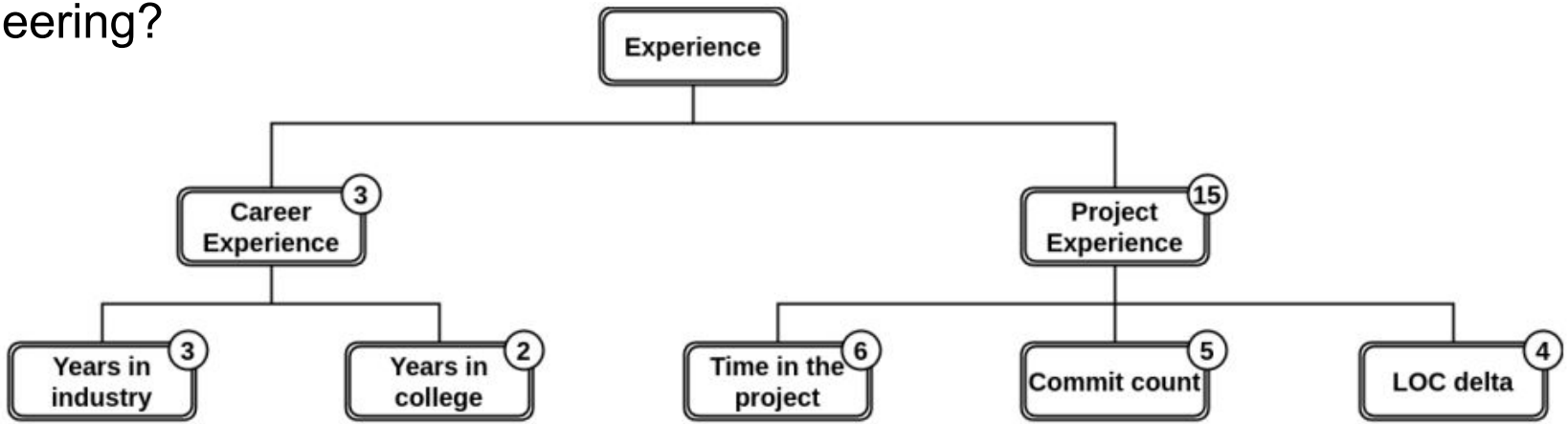


Figure 3. Dimensions and sub-dimensions of a developer's experience and a count of how many papers utilized it. A study can have more than one definition.

RQ2: What metrics or methods are used to evaluate software quality?

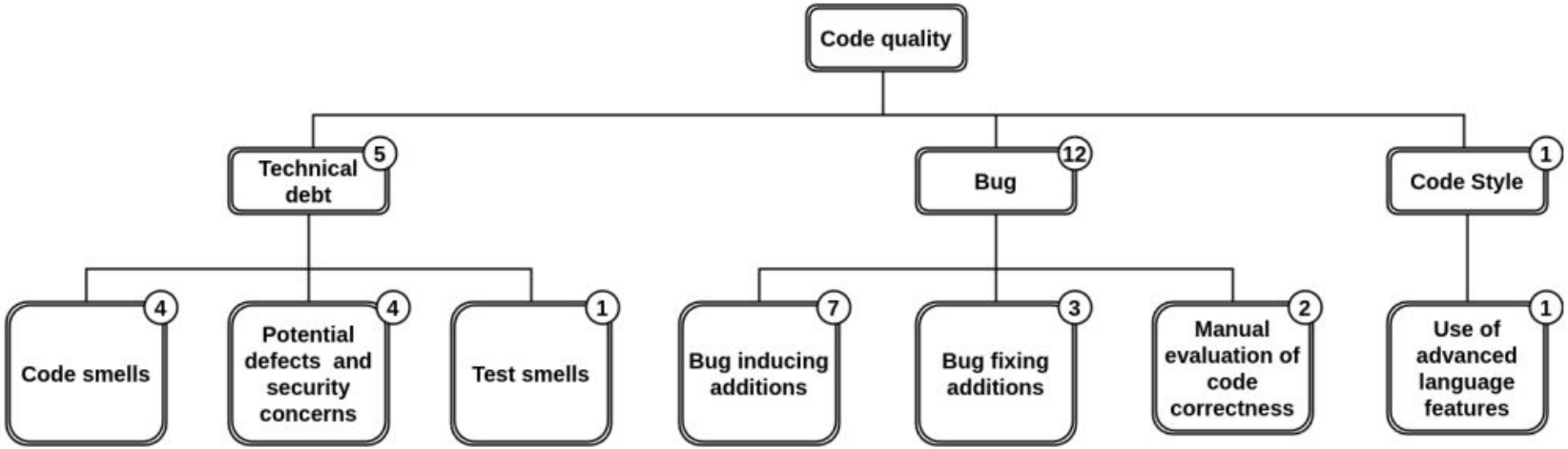


Figure 4. Dimensions and sub-dimensions of a developer's code quality. A study can have more than one definition.

RQ3: How does developer experience relates to code quality?

We classified the results as follows:

- more experience relates to better code quality;
- more experience relates to worst code quality;
- it is not possible to establish a relationship;

Warning: correlation !== causation;

Results

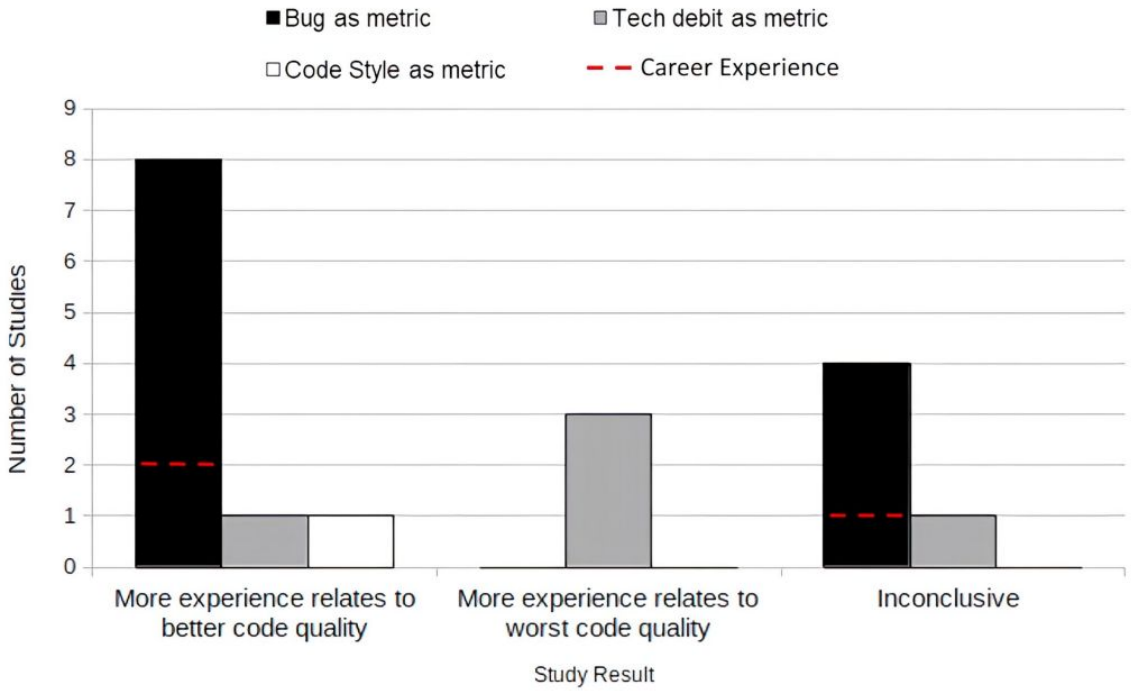


Figure 5. Overall relationship between experience and code quality.

RQ1 summary:

In the context of software engineering, developer experience is primarily evaluated through 2 dimensions: **Career Experience** and **Project Experience**.

Career Experience focuses **on the chronological time spent in the field**, reflecting a broad understanding and depth of knowledge, while Project Experience emphasizes the **diversity and volume of work on specific projects**, highlighting specialized skills and problem solving capabilities

RQ2 summary:

Software quality in this context is evaluated through metrics and methods that can be categorized into **Technical Debt**, **Bugs**, and **Code Style**.

Technical Debt assesses the **long-term impact** of initial development choices, Bugs focus on **software functionality issues** confirmed by human verification, and Code Style examines **practices for maintainability and readability**.

RQ3 summary:

Studies on the relationship between developer experience and code quality show **mixed results**: some indicate that **more experience improves quality**, **others suggest a negative impact**, and a few find **no clear link**.

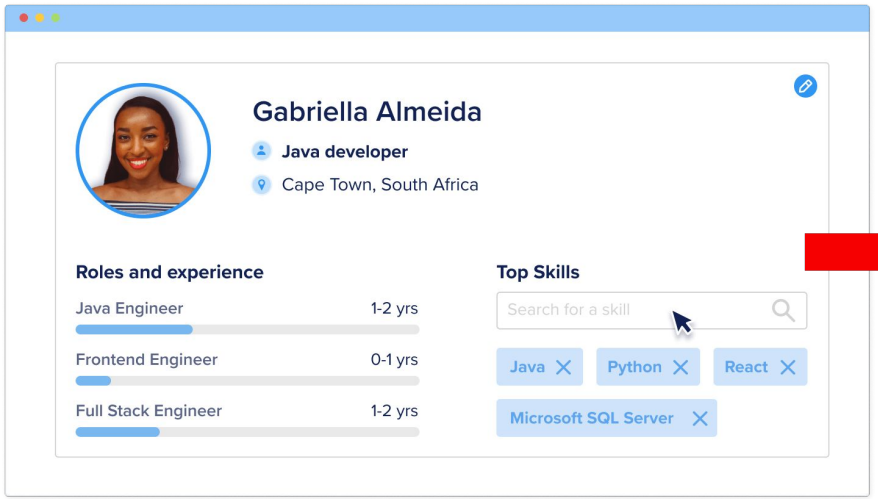
Evidence highlights a correlation, not causation, between experience and code quality, with varied findings across different metrics of quality.

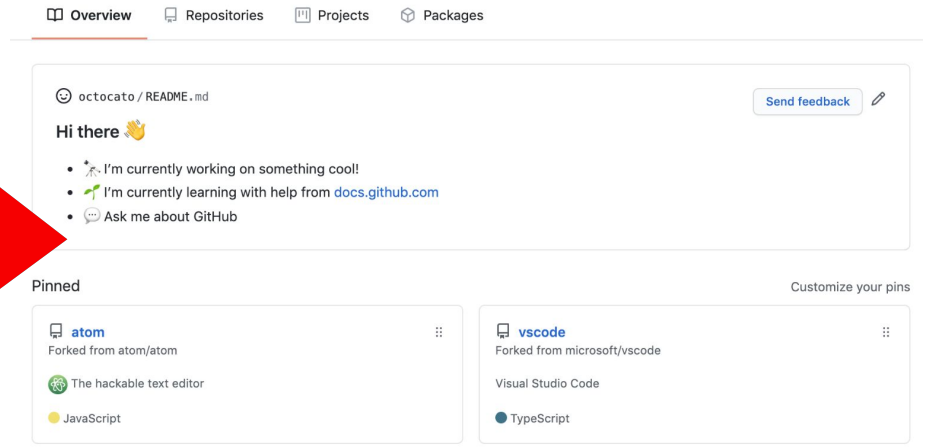
Conclusions & Recap

- The relationship between experience and code quality is complex;
- More research is needed regarding Career Experience and metrics of code quality;
- Technical Debt and Code Style are not yet well explored as metrics of code quality (in this context);
- No definitive consensus exists when using any type of experience in conjunction with Technical Debt or Code Style as metrics of code quality;
- A clear consensus exists regarding Project Experience and Bugs as a metric of code quality.

Next Steps

1. By extracting self-declared skills from public profiles (like LinkedIn, Workana, Freelancer and etc), garther our own data.





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Next Steps

2. Summarize what was the metrics of the previous studies when using static code analysis.

3. Run the metrics on the Git repositories and extract the results;

4. Compare with previous studies;

With a new research technique, it is possible to contribute to a rather unexplored area: Career Experience Vs Technical Debt.

Thank you

Questions?