Can Automated Feedback Turn Students into Happy Prologians?

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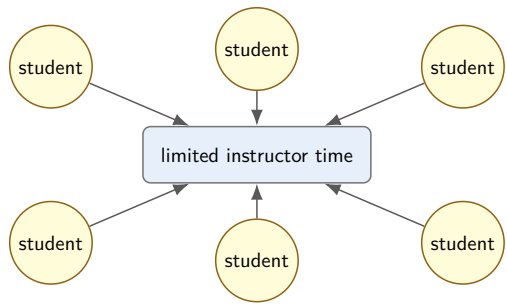
The problem: feedback does not scale

- Timely, personalized feedback matters for learning and computer-aided education.



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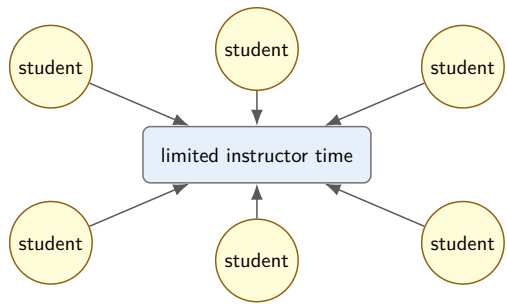

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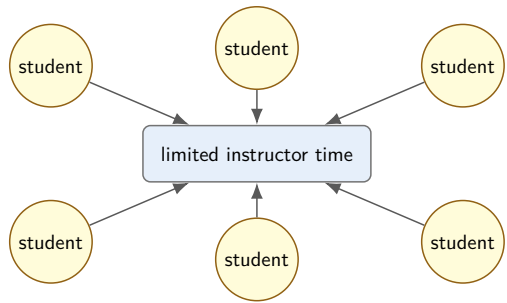

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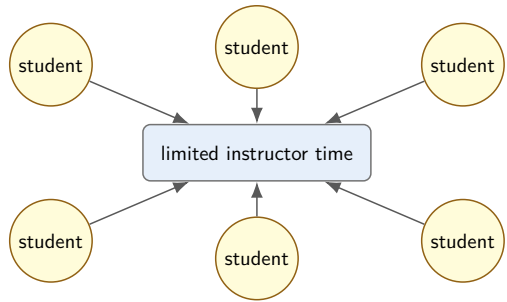
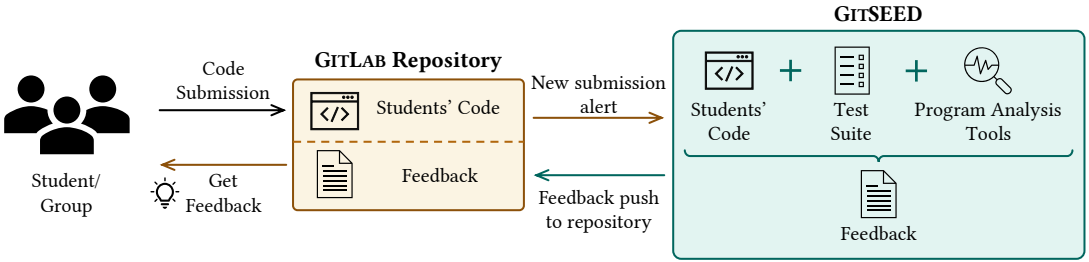


Question

Can automated feedback help students debug PROLOG, and which feedback do students actually value?

ProHelp: feedback inside the students' Git workflow



Design goal

No new assessment interface: students receive immediate feedback where they already submit and version their code.

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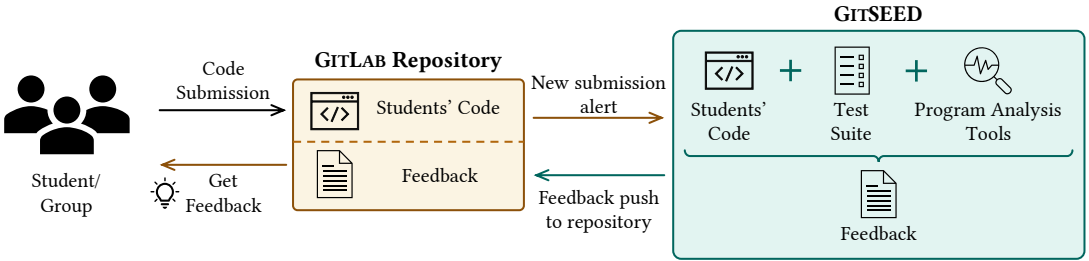

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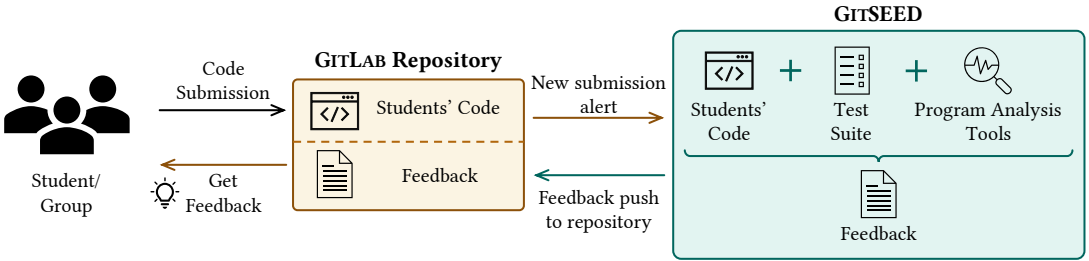

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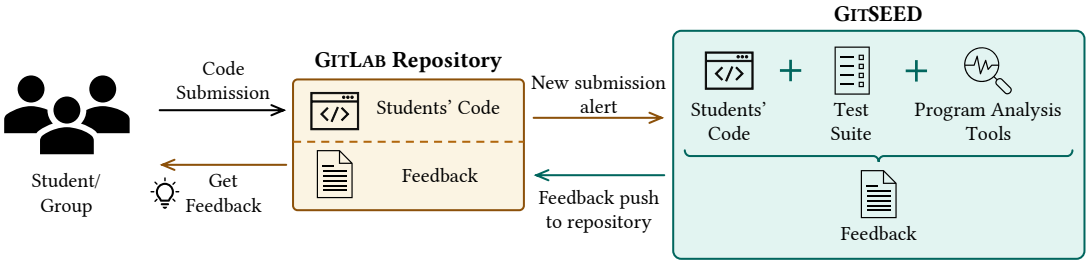

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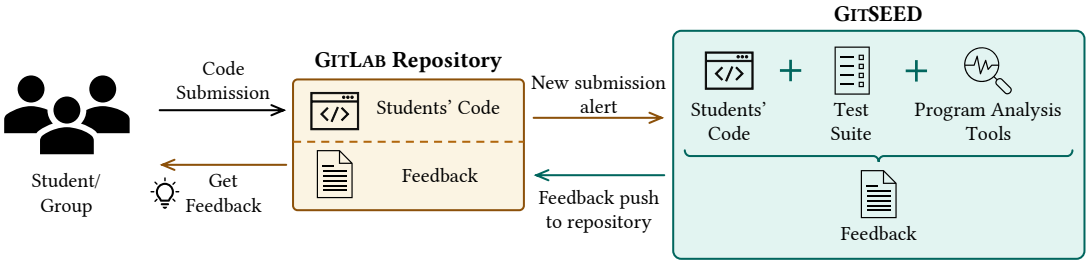

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No new assessment interface: students receive immediate feedback where they already submit and version their code.

- A git push triggers the pipeline.
- GitSEED runs tests and analyses.
- ProHelp commits a report back to the repository.
- Students iterate from the feedback.

Seven feedback mechanisms

1. **Automatic testing**

Seven feedback mechanisms

1. **Automatic testing**
2. **Predicate scoring**

Test 1: Successful

Test 2: Successful

Test 3: Unsuccessful

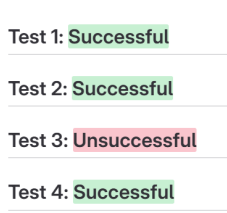
Test 4: Successful

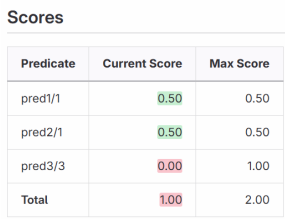
Scores

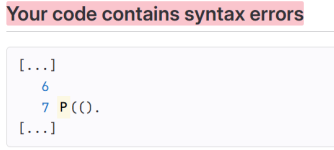
Predicate	Current Score	Max Score
pred1/1	0.50	0.50
pred2/1	0.50	0.50
pred3/3	0.00	1.00
Total	1.00	2.00

Seven feedback mechanisms

1. **Automatic testing**
2. **Predicate scoring**
3. **Syntax highlighting**







Seven feedback mechanisms

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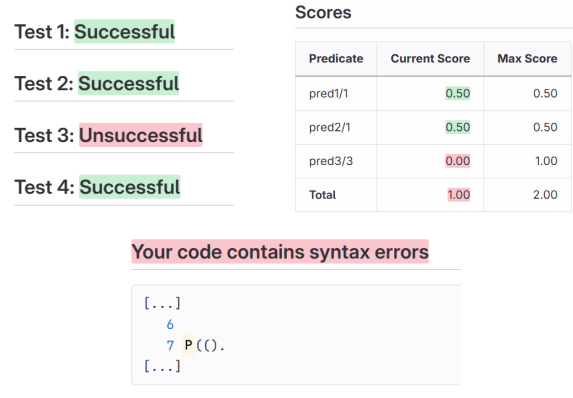

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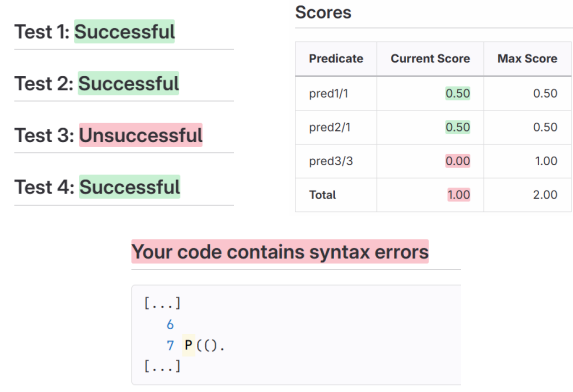

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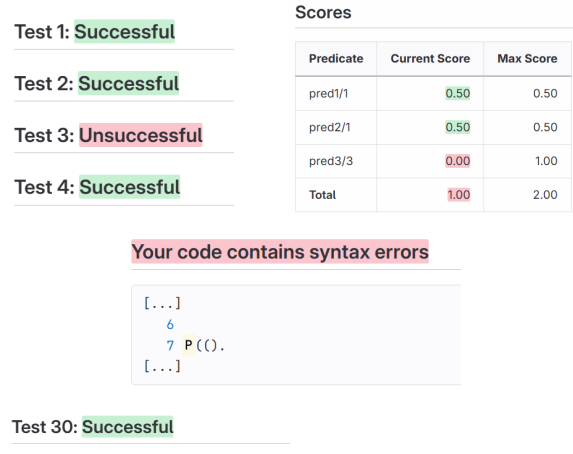
6. **Solution-type validation**



Seven feedback mechanisms

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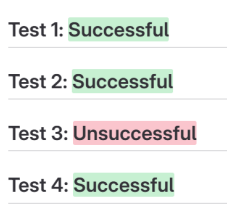

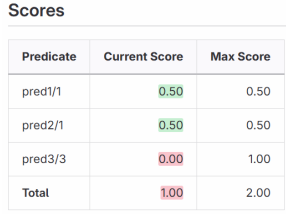

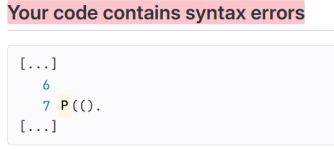

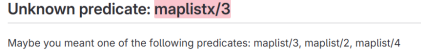

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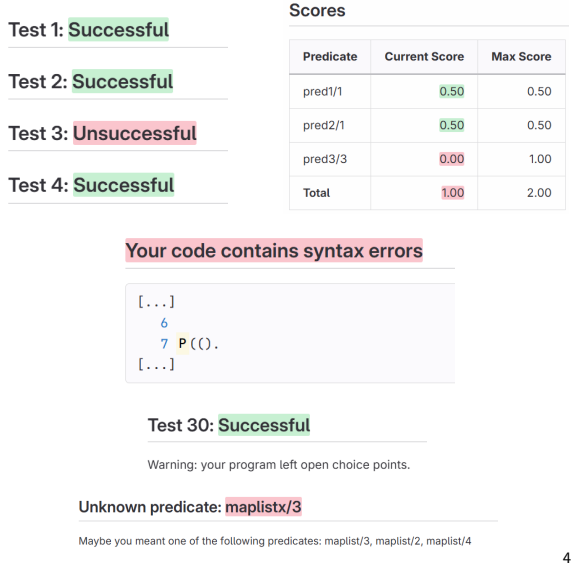
Range

Correctness, localization, Prolog-specific behavior, and implementation constraints.



Study at a glance

Deployment

- BSc logic for programming course

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- 365 enrolled students

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Survey

- 148 responses

Study at a glance

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Survey

- 148 responses
- 144 valid after attention checks

Study at a glance

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Survey

- 148 responses
- 144 valid after attention checks
- post-experience Likert questions

Study at a glance

Deployment

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- 148 responses
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- usefulness, student factors, and future features

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- 148 responses
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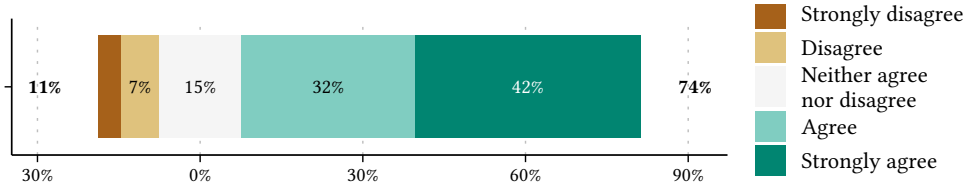
- usefulness, student factors, and future features

365 enrolled $\rightarrow$ **312** users $\rightarrow$ **144** valid survey responses

Did students think feedback helped?



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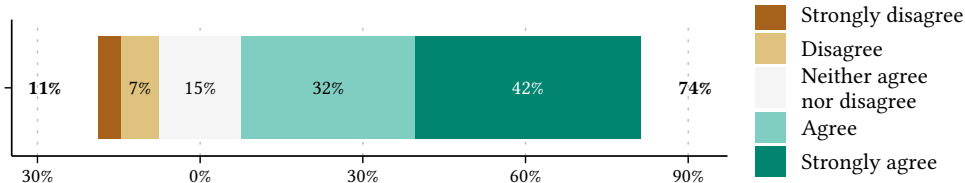
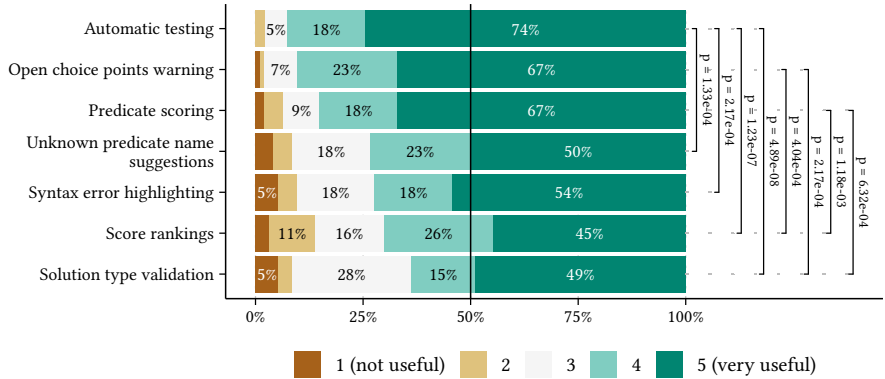


Helpful?

Most respondents agreed that the automated feedback helped improve their course grade.

R1: Students found all types of feedback helpful



Clear winner

Automatic testing was rated most useful: 74% of valid respondents selected the highest usefulness level.

Result 2: Who found ProHelp helpful?

RQ2

Do students' prior interest and behaviour affect how helpful they find ProHelp overall?

Interest in Prolog

No evidence of an effect

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Interest in Prolog	**Use of optional exercises**
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Interest in Prolog	**Use of optional exercises**	**Use of LLMs**
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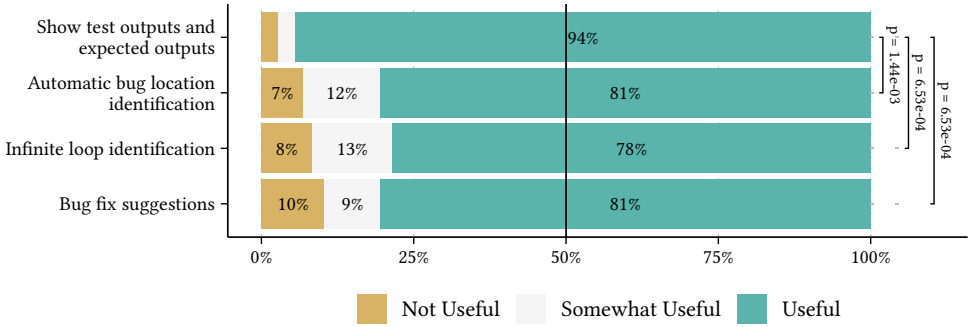
Do students' prior interest and behaviour affect how helpful they find ProHelp overall?

Interest in Prolog	**Use of optional exercises**	**Use of LLMs**
No evidence of an effect	No evidence of an effect	No evidence of an effect

Answer

There is no evidence that interest level, use of the platform for optional exercises, or use of LLMs affects how helpful students found ProHelp overall.

What students want in the future?



Future directions

Students want stronger diagnosis and repair support, but the system should guide without simply revealing the solution.

Takeaways

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Can Automated Feedback Turn Students into Happy Prologians?

Yes, automated feedback can make happier Prologians, especially when it is immediate, concrete, and helps them debug rather than merely grades them.

Discussion

Questions?

This work supported by Portuguese national funds through FCT, under project 2023.14280.PEX (DOI: 10.54499/2023.14280.PEX). This work was also supported by grant PID2022-139835NB-C21 funded by MCIN/AEI/10.13039/501100011033 and by ERDF, EU; and by HORIZON-MSCA-2025-PF research and innovation programme under the Marie Skłodowska-Curie (Sherlock4Py, GA No 101269051).. This work was additionally supported by the Carnegie Mellon University Portugal Program and FCT under grants PRT/BD/152086/2021 (DOI: 10.54499/PRT/BD/152086/2021) and PRT/BD/153739/2021 (DOI: 10.54499/PRT/BD/153739/2021). This work was also partially supported by the National Science Foundation (NSF) under Award CCF2427581 and DARPA under Agreement FA8750-24-9-1000.