ID	Paper Title	Publication Year	Main Aim/Research Question	Potential Skill Level Discriminator	Results & Conclusion
1	**Evaluation of Python Error Message Interpretation: Study on Students with Different Levels of Programming Experience**	September 2023	How does past programming experience influence bug fixing ability and time taken to find errors in Python?	Error message interpretation and fixing speed	Experienced programmers were significantly better at correctly finding and fixing bugs. Correlations found between fixing success and number of programming languages known (as well as chosen major and their age).
2	**Frequency Distribution of Error Messages**	September 2015	Which programming error messages are most common among novices in Python and Java?	Error message frequency patterns (Java & Python collected data)	Error messages follow Zipf-Mandelbrot distribution; a few types of errors account for most occurrences. Syntax errors are the most frequent.
3	**Rule-Based Error Classification for Analyzing Differences in Frequent Errors**	November 2023	Create a rule-based tool to classify syntax and logic errors and analyze differences between novice and expert programmers.	Types and patterns of errors made by different skill levels (Python collected data)	Novice errors stem from lack of fundamental knowledge; expert errors come from misreading problems.
4	**Meaningful categorisation of novice programmer errors**	October 2014	Can student errors be categorized objectively and what are the most common errors?	Error patterns and frequency distribution (Java collected data)	Top 10 Java errors account for 59% of all errors; human analysis categorizes errors more accurately than compiler messages.

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5	**Common logic errors made by novice programmers**	January 2018	What are the most common logic errors students make and which are most problematic to fix?	Types of logic errors and difficulty in fixing them (C collected data)	Misconceptions are the most frequent source of logic errors and the most difficult to resolve.
6	**An analysis of patterns of debugging among novice computer science students**	September 2005	How do debugging patterns differ among students and what is the relationship with programming ability?	Debugging capability vs programming ability (Java collected data)	Good debuggers are usually good programmers, but less than half of good programmers are good debuggers.
7	**Detection and Categorization of Errors by Novice Programmers in a First Year Java Programming Class: A Comparative Analysis**	May 2015	Can early tutorials on Java programming errors help reduce novice mistakes?	Impact of error awareness on performance (Java collected data)	Early tutorials reduce syntax and runtime errors but logical errors remain challenging.
8	**Identifying and Correcting Java Programming Errors for Introductory Computer Science Students**	January 2003	What are common Java errors for beginners and how to create an educational tool to address them?	Understanding of language intricacies (Java collected data)	Identified 62 common errors, with 20 being essential; syntax and semantic errors are most prevalent.

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9	**Common mistakes made by novice programmers: A comparison between Java and Python**	June 2023	How do novice errors compare between Java and Python?	Language-specific vs universal error patterns (Java & Python collected data)	Many errors are prevalent across both languages, suggesting shared challenges for novices.
10	**Visualizing Code Patterns in Novice Programmers**	May 2018	How to identify and visualize poor coding habits and their correlation with confidence levels?	Coding habits and confidence levels (Java collected data)	Bad habits can be automatically identified; confidence levels correlate with error frequency. Students who are more confident exhibit fewer bad habits.
11	**Novice/expert differences in programming skills**	October 1985	Do expert programmers demonstrate automation in low-level programming tasks?	Speed and accuracy in routine tasks (Fortran experiments... old study)	Experts were twice as fast and more accurate, showing automation of basic skills.
12	**Categorizing Compiler Error Messages with Principal Component Analysis**	May 2016	Are there hidden relations between different types of compiler errors?	Error correlation patterns (Java collected data)	Related errors cluster together; students who make one type often make related errors. First paper to use PCA to categorize compiler errors.
13	**All syntax errors are not equal**	July 2012	Which syntax errors are most common and time-consuming to resolve?	Error resolution time and frequency (Java collected data)	Some errors consume disproportionate time for all skill levels; higher performers resolve certain errors faster.

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14	**The neglected battle fields of syntax errors**	April 2003	How do novices and experts approach syntax error correction?	Error correction strategies (C collected data)	Experts use systematic debugging techniques; novices benefit significantly from reference guides.