Defect Detection Efficiency: Test Case Based vs. Exploratory Testing

DOI: 10.1109/ESEM.2007.56

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The study aimed to compare the effectiveness of exploratory testing (ET) and testcase-based testing (TCT) in detecting software bugs. Given the increasing adoption of ET in agile environments and the traditional reliance on TCT, the research tried to determine whether ET could match or outperform TCT in defect detection efficiency.

A controlled experiment was conducted involving 79 advanced software engineering students. Participants engaged in two 90 minutes testing sessions: one employing ET and the other TCT. The sessions involved manual functional testing of an open-source application seeded with both real and artificial defects. Data collected included the number of defects detected, false positives reported, and the severity and type of defects identified.​

The findings indicated no significant difference in the number of defects detected between ET and TCT. However, TCT sessions resulted in a higher number of false defect reports compared to ET. The types and difficulty of detected defects were similar across both testing approaches. These results suggest that ET is as effective as TCT in defect detection while producing fewer false positives.

The study challenges the traditional emphasis on predesigned test cases by demonstrating that ET can achieve comparable defect detection efficiency with fewer false positives. For practitioners, incorporating ET into testing strategies may enhance efficiency and reduce the overhead associated with test case maintenance. For researchers, the findings highlight the need for further studies on the effectiveness of ET in various contexts and its integration into standard testing practices.