Becoming a Software Testing Expert

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Are you a Testing Expert?

- Analyze these claims:
  1. “You should write a test plan”
  2. “It’s important that testing be repeatable”
  3. “Each test case should have an expected result”
  4. “Test automation saves money and time”
  5. “All testing is based on a model of what being tested”
  6. “Good enough quality is not good enough”
  7. “An undocumented test cannot be improved”
  8. “Exploratory testing is a useful practice”
  9. “It’s better to use the term defect than bug”
  10. “Ambiguity should be removed from requirements.”
Take the Expert Challenge

1. You are using a calculator.
2. You press the keys “2+2=”

What is the expected result?

Take the Expert Challenge

- You want to test the interaction between two potentially overlapping events.
- What are the test cases?
Take the Expert Challenge

What is *boundary testing* and how is it done?

Please explain your testing methodology, cogently, in five minutes or less.

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Experts vs. Non-Experts

*I believe... for any given claim or problem...*

- **Non-Experts are More Likely to Say...**
  - Yes, that’s what the books say.
  - This is right.
  - That is wrong.
  - I don’t know. {awkward silence}

- **Experts are More Likely to Say...**
  - Tell me more about the context.
  - I can think of how that might be true and I can think of how it might be false. Let’s think it through...
  - Let me reframe that...
  - Here are some possible answers...
  - Here’s one way I’ve solved this...
  - I don’t know. Here’s how I will find out...
These are my credentials

I also have:
- Level 1 paraglider pilot certification
- PADI open water diver certification
- Driver’s license (state of Virginia)
- Student private pilot license (expired)
- Motorcycle license (expired)

8th grade diploma!

Resigned high school in ’82.
By “expert tester” I mean any of the following...

- Someone who’s very good at testing.
- Someone who’s considered to be an expert.

You may already be an expert tester.
What I want to do is help you become even better, according to whatever standard that matters to you.

Perfect testing is...

Testing is the infinite process of comparing the invisible to the ambiguous so as to avoid the unthinkable happening to the anonymous.

In other words, perfect testing is a challenge.
A more tractable definition...

Testing is *questioning* a product in order to *evaluate* it.

Through the *cognition* of the tester, good testing emerges from the infinite space of perfect testing.

What’s Special About Testing

- There are few people around to teach you how to test.
- Most of what is taught as “testing” is unreliable or misleading folklore.
- Testing is a complex problem-solving activity.
- Learning testing on your own doesn’t cost you much, you don’t need anyone’s permission, and it generally poses no threat to life or property.

**However...**
- It’s hard to know if you are doing it well.
- Good testing varies quite a lot with the context.
What’s Special About Testing

Testing is not part of Computer Science.

(But knowing Computer Science helps)

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I belong to the Context-Driven Testing Community. We follow certain principles.

1. The value of any practice depends on its context.
2. There are good practices in context, but there are no best practices.
3. People, working together, are the most important part of any project's context.
4. Projects unfold over time in ways that are often not predictable.
5. The product is a solution. If the problem isn't solved, the product doesn't work.
6. Good software testing is a challenging intellectual process.
7. Only through judgment and skill, exercised cooperatively throughout the entire project, are we able to do the right things at the right times to effectively test our products.

source: Lessons Learned in Software Testing, by Kaner, Bach, Pettichord
### Some Cool Things That Experts Have and Do

<table>
<thead>
<tr>
<th>Experts have…</th>
<th>Experts do…</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Situational awareness</td>
<td>- Avoid traps and dead ends</td>
</tr>
<tr>
<td>- Confidence in confusion</td>
<td>- Systematic inquiry</td>
</tr>
<tr>
<td>- Colleague network</td>
<td>- Confront authority and convention</td>
</tr>
<tr>
<td>- Trained reflexes</td>
<td>- Self-training and retraining</td>
</tr>
<tr>
<td>- Awareness of limitations</td>
<td>- Self-criticism</td>
</tr>
<tr>
<td>- Diverse experiences</td>
<td>- Pattern matching on experience</td>
</tr>
<tr>
<td>- Relevant knowledge</td>
<td>- Coherent explanations</td>
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<tr>
<td>- Mental models for problem-solving</td>
<td>- Justify methodology</td>
</tr>
<tr>
<td>- Reputation</td>
<td>- Write, speak, teach</td>
</tr>
</tbody>
</table>

### What an Expert Sounds Like

*Steve McQueen, Towering Inferno*

[talking to fire commissioner] **What do we got here, Kappy?**
Fire started, 1st floor, storage room. It's bad. Smoke's so thick, we can't tell how far it's spread.

**Exhaust system?**
Should've reversed automatically. It must be a motor burnout.

**Sprinklers?**
They're not working on 1.

**Why not?**
I don't know.

[talking to architect] **Jim? Give us a quick refresher on your standpipe system.**
Floors have  and -inch outlets.

**GPM?**
Fifteen hundred from ground to from to and from there to the roof.

**Are these elevators programmed for emergencies?**
Yes.

**What floor are your plans on?**
My office.

**That's two floors below the fire. It'll be our Forward Command. Men, take up the equipment. I wanna see all floor plans, through 1.**
Expert Performance is Situational.

Expertise is situated...

- ...socially.  
  If your clients and peers don’t like your work, you won’t be able to function as an expert in their eyes.

- ...psychologically.  
  If you’re tired, angry, or indifferent, you won’t perform well.

- ...technically.  
  If you don’t know anything about databases, for instance, you will be limited in how well you test them.

A Personal Vision of Testing Expertise

“‘I can…”
  - test anything…
  - under any conditions…
  - in any time frame...

HOW IS IT POSSIBLE?!?

AMAZING CLAIM!
A Personal Vision of Testing Expertise

“Relative to…”
- my standing in the local community...
- how hard I try...
- my technical insight...

“...I can…”
- test anything…
- under any conditions…
- in any time frame...

…that's do-able.

“…such that,”
- I deliver useful results in a usable form.
- I perform at least as well as any other expert would.
- I choose methods that fit the situation.
- I can explain and defend my work on demand.
- I collaborate effectively with the project team.
- I make appropriate use of available tools and resources.
- I advise clients about the risks and limitations of my work.
- I advise clients about how they can help me do better work.
- I faithfully and ethically serve my clients.
Notice? No “Testing” Books!

- Gödel, Escher, Bach: An Eternal Golden Braid, Douglas Hofstadter.
- The Sciences of the Artificial, 3rd Ed., 1996, Herbert A. Simon
- Introduction to General Systems Thinking, 1975, Gerald M. Weinberg.
- Secrets of Consulting, 1986, Gerald M. Weinberg
- General Principles of Systems Design, 1988, Gerald M. Weinberg, Daniela Weinberg
- Tools of Critical Thinking, 1997, David A. Levy
- The Social Life of Information, 2000, John Seely Brown, Paul Duguid
- How to Solve It, 1945, George Pólya
- How to Read and Do Proofs, 1990, Daniel Solow
- Judgment and Decision Making, 2000, Terry Connolly, et al
- Cognition in the Wild, 1996, Edwin Hutchins
- Thinking and Deciding, 1994, Jonathan Baron
- Lateral Thinking: Creativity Step by Step, 1990, Ed De Bono
- Abductive Inference: Computation, Philosophy, Technology, 1996, John R. Josephson, Susan G. Josephson
- Time Pressure and Stress in Human Judgment and Decision Making, 1993, Ola Svenson, A. John Maule
- Proofs and Refutations, 1976, Imre Lakatos
- The Pleasure of Finding Things Out, 1999, Richard Feynman
- Rethinking Systems Analysis and Design, 1988, Gerald M. Weinberg
What Level of Learning?

- **Level 0:** “I overcame obliviousness.”
  - I now realize there is something here to learn.

- **Level 1:** “I overcame intimidation.”
  - I feel I can learn this subject or skill. I know enough about it so that I am not intimidated by people who know more than me.

- **Level 2:** “I overcame incoherence.”
  - I no longer feel that I’m pretending or hand-waving. I feel reasonably competent to discuss or practice. What I say sounds like what I think I know.

- **Level 3:** “I overcame competence.”
  - Now I feel productively self-critical, rather than complacently good enough. I want to take risks, invent, teach, and push myself. I want to be with other enthusiastic students.

Developing your expertise

- **Observing & Recording**
  - compare realities

- **Studying & Modeling**
  - compare ideas

- **Experimenting & Performing**
  - compare practices
All Product Testing is Something Like This

Project Environment

Test Techniques

Quality Criteria

Product Elements

Perceived Quality

Thirty-Six Testing Heuristics

"cidtestdsfdpotcrusspicstmplfdsscur"
What About Certification?

- A lot of people feel that college degrees comprise some kind of certification. I haven’t felt a need for them.
- I have not seen a “Certified Tester” program that I respect. The ones I’ve seen are an embarrassment to the craft and an insult to skilled testers everywhere.
- **Certification by association** has worked well for me.
- **Certification by body of work** also works well.
- **When you make a name for yourself, your name trumps any “certification” you might also have.**

My Advice to New Experts

- Practice, practice, practice!
- Don’t confuse experience with expertise.
- Don’t trust folklore— but learn it anyway.
- Take nothing on faith. Own your methodology.
- Drive your own education— no one else will.
- Reputation = Money. **Build and protect your reputation.**
- Relentlessly gather resources, materials, and tools.
- Establish your standards and ethics.
- Avoid certifications that trivialize the testing craft.
- Associate with demanding colleagues.
- Write, speak, and **always tell the truth as you see it.**