What should I learn next?
Discovering Economically-Rewarding Education Paths

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Warning: Description of research in progress follows. Those offended by obvious mistakes are advised to leave the room
The (business) problem

• Demand does not match supply

• Oversupply of basic skills

• Demand for skilled workers exceeds supply
Prices fix everything, right?

- Marketplace not a closed system
- Unmet demand will go elsewhere
- Unmet supply will go elsewhere
Marketplace’s best interest

Get contractors to learn new skills
Question #1

What skills are in demand?
Server, Database, Admin Panel Guru needed

Job Description

I am looking for someone to help build a few back end web servers/databases/admin panels for some mobile apps. I am looking for the following:

- Developer must work on milestone payments (Although I will allow the job to show as hourly, all hourly time will either be added via workview in a way we agree in advance, or added manually after milestones are given)
- Developer must be able to create a web server from scratch (PHP/MySQL) on an Amazon Web Host
- Developer must be familiar with 'easy to use' mobile back end services like Stackmob, and Parse and be able to create a web back end services that can connect to these services

Android Developer Needed

Job Description

I have a couple of Android projects that I need developed quickly. I would like to work with someone who can agree to the following:

- Work View Time logging (with weekly limit) with Milestone payments
- Source code updated on Github

Fun IOS Game needed - Turn Based like Words With Friends

Job Description

Hi,
Notice - If you have ever developed any type of “board game” app this project may be for you ;:-)

We are looking for an expert developer to join our team. We have a small team of 5 that have a passion for making games and quality apps. We are busy with a number of projects and need an extra man/woman to join the team and develop our latest game.
Controlled Skilled Vocabulary

The iPhone is a line of smartphones designed and marketed by Apple Inc. It supports third party applications called apps. These apps have diverse functions, including games, reference, GPS navigation, social networking, security, and advertising for television shows, films, and celebrities. [wikipedia.org](http://81.171.104.157/wikisyno/index.php?action=search)

Jobs: 1,336 | Contractors: 6,649

Unity is an integrated authoring tool for creating 3D video games or other interactive content such as architectural visualizations or real-time 3D animations. [wikipedia.org](http://81.171.104.157/wikisyno/index.php?action=search)

Jobs: 211 | Contractors: 845
Worker Skills

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J2EE D2+ level dev., Android dev., web-designer, selenium, glassfish

Self-selected and entered
Question #2: Skill Assessment

But are contractors truthful?

Michael Arshinov

J2EE D2+ level dev., Android dev., web-designer, selenium, glassfish

$33.56/hr

5 stars (4.89)

Keywords:
- jee
- xhtml
- database-modeling
- android-development
- jboss
- glassfish
- ejb
- jquery
- selenium
- spring-framework
- apache-struts
- web-services
- hibernate
- jasperreports
Example question:

It is not only important to be on time, ________ courteous when replying to colleagues.

(a) but is it also important to be
(b) but also is it important being
(c) but it is also important to be
(d) but important it is also to
Qualification Task #1: Business listing verification

• For a specific University name and department, what are the first three names of professor that appear on webpage

• First names of all professors
• Last names of all professors
• Position titles of all professors
Qualification Task #2: Business listing verification

- For various non-profit companies, find the CEO, Chairperson of Board, and other contact info
- First and last name of Board
- Position titles of all professors
Predictive model for success in the marketplace

• Time on tests predictive of time required for actual tasks

• **However**, skills tests do not work as well as simply measuring performance on past work

• So, we want tests that are more like "real" tasks...
it is time to draw! you'll be given 5 minutes to draw a random word

I'm ready to draw!

not yet, I'd rather vote some more...
draw a **home**. time left: 4:41
Which artist would you hire?
Which artist would you hire?

[Image of two artists, one with a laptop displaying a design and the other with a laptop displaying a graphic]

skip »
Across-task Reputation

• What is the affinity across types of tasks?

• If someone is good in sales, what do we know about their writing? About web development?
Results

- Knowing type of prior tasks leads to better performance estimates.
- 35-45% improvement in future performance prediction.
Skill-specific Training

• For “KPO” (*) tasks:
  – General history sufficient
  – “A good admin is a good writer [when self-selected]”

• For technical tasks:
  – Past performance in tasks with similar skill requirements is predictive
Question #3

What job streams (*) are best for each contractor?

Michael Arshinov
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$33.56/hr

jee  xhtml  database-modeling  android-development  jboss  glassfish  ejb  jquery  selenium  spring-framework  apache-struts  web-services  hibernate  jasperreports

(*) Individual jobs fill quickly, and queries repeat
Utility of Skill/Job Stream

Heroku is a cloud platform as a service (PaaS) run by the San Francisco, California-based company with the same name. Heroku led the way for a multi-language PaaS, introducing the 'polyglot platform'. Heroku PaaS now supports six languages: Ruby, Java, Node.js, Scala, Clojure and Python cloud PaaS. [wikipedia.org](http://wikipedia.org)

Jobs: 117 | Contractors: 96

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Google App Engine is a platform as a service (PaaS) cloud computing platform for developing and hosting web applications in Google-managed data centers. It virtualizes applications across multiple servers. [wikipedia.org](http://wikipedia.org)

Jobs: 95 | Contractors: 2,270

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Webapp development for online travel agency

Hourly - Est. Time: More than 6 months, 40 hrs/week - Posted 1 day ago

Our company is an online travel agency, based in Norway, and we are looking to hire a team of for a long-term project, with a possibility of permanent employment. If you have expertise in any looking for you. Please send me your resume and cover letter along with samples of your work include: 1. Your relevant experience for this project 2. Your prof... more

Client: [NEW] Skills: html, javascript, ruby-on-rails, python, google-app-engine, go-programming-language, ui-design, Qualifications

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Chat App with location

Fixed-Price - Est. Budget: $200 - Posted 2 days ago - 2 Interviews

looking for experienced developer who can make a chat application and integrate the location by details will be provided at later stage.

Client: [NEW] Skills: gss, google-app-engine, live-chat-software, Qualifications

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Hybrid iPhone/Android app

Hourly - Est. Time: Less than 1 month, 40 hrs/week - Posted 3 days ago

I need an App programmer who is familiar with hybrid App building using a web based wysiwyg program the pages necessary to port into the App by either HTML or fed from a mobile web site pages for financial calculations) ... If you are building Apps, this should be very easy have a web based platform service for building Apps that you may be able ... more

Client: [NEW] Skills: html, javascript, phone-app-development, android-development, ios-development, Qualifications

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Data Visualization Specialist Needed to display Building Energy

Data

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Utility of Skill

\[ U = F(\text{Jobs}, \text{OfferedRate}, \text{AskingRate}) \times \text{Pr(hired)} \]
$Pr(hired)$
Question #4

What skills (if any) should a contractor learn?

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jee  xhtml  database-modeling  android-development  jboss  glassfish  ejb  jquery  selenium
spring-framework  apache-struts  web-services  hibernate  jasperreports

(*) Individual jobs fill quickly, and queries repeat
Utility of (Future) Skills

\[ U = F(\text{NewJobs}, \text{NewOfferedRate}, \text{NewAskingRate}) \times \text{NewPr(hired)} \]
What is the **utility** of each skill?
What is the **utility** of each skill?

Hey, do you have a (good) machine learning person that I can hire through oDesk? Cost is not a problem!
What is the **utility** of each skill?
What is the **utility** of each skill?
OK, problem solved! (not)
“Market for Intellect”: Model

- Assume market is “mostly efficient”
  - Some skill channels do have higher utility than others
  - Utility is “similar” across skill channels, adjusted for crossing costs
  - But jumping across channels has an opportunity cost

- Workers self-select skills to learn:
  - If worker does not have skill, this is not random but a choice (“endogenous choice”): The “Return on investment” is negative/small

- Estimate distribution of utilities across workers

- Estimate distribution of “time to learn”
What is the *opportunity cost*?

\[
\text{Cost(Skill)} = \text{“Utility of Current Skills”} \times \text{“Time to Learn”}
\]

\[
\begin{align*}
U(\text{Current\_Skills}) &= F(\text{Jobs, OfferedRate, AskingRate}) \times Pr(\text{hired}) \\
U(\text{Future Skills}) &= F(\text{Jobs’, OfferedRate’, AskingRate’}) \times Pr’(\text{hired})
\end{align*}
\]

Differences in utility between old and new skills show how long it takes to learn a skill.
Barriers to entry:
Utility vs. Opportunity Cost

- PHP → iPhone Development
- PHP channel
- iPhone channel
- Machine Learning channel
- $$$$$
- $$$$$
- $$$$$
- $$$$$
- $$$$$
- $$$$$
What is the net utility of each skill?
Thanks!

Questions?