

Optimizing Recruitment for Programmers

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Lead researcher

Quantitative: Survey, experimental design

Overview

Research Problem: It's very **difficult** to **recruit skilled participants** for empirical software engineering studies

Research Goal: Provide **best practices** for recruiting participants with programming skills

amazon mechanical turk

 appen

 Prolific

 clickworker

Context

- Researchers often use crowdsourcing & computer science students
- But **reliability** is often questioned
- **No established method**



Research Questions

1. **Optimal recruitment channels** for programming-skilled participants?
2. **Reliable self-reported indicators** for passing programming screenings?
3. Comparing **privacy attitudes and secure development** among programming-skilled recruits in diverse channels.



Constraints

- Need for a **large sample** to enable statistical comparisons
- Understanding **popular recruitment methods** and **scales** for measuring programming, security, and privacy



Method

- **Quantitative** online experiment:
Developers (N=613)
- Sources: **Appen, Clickworker, MTurk, Prolific, CS students**
- **Evaluated self-reported skills vs. actual experience**
- Analyzed recruitment channels for **cost, quality, skills, privacy, and security attitudes.**
- **Standard scales & popular recruitment channels to enable comparison.**



High-Level Findings

- **Most cost-effective: CS students**
 - Programming skills (highest)
 - Cost (lowest) \$3.76 per skilled participant
 - Number of duplicates (low)
 - Passing attention check questions (high)
- **Crowdsourcing**
 - **Prolific (best)** \$12.57 per skilled participant
 - Clickworker (not useful)
 - MTurk (not useful)
 - Appen produced zero skilled participants

	Appen	Clickworker	MTurk	Prolific	CS Students	Total
<i>Screening survey</i>						
Requested	2,500	1,610	1,933	Used	Wasn't	6,043
Completed on platform	1,684	1,050	1,225	Prolific's	screened	3,959
Completed on Qualtrics	1,680	1,082	1,228	screening	(Students	3,990
Duplicates	512 (30.5%)	12 (1.1%)	39 (3.2%)	(Eligible	on the	563 (14.1%)
Passed, invited to main	50 (3%)	132 (12.2%)	265 (21.6%)	Participants:	mailing list:	789 (19.8%)
Cost	\$358.48	\$297.06	\$357.07	7,797 of	2,728)	\$1,012.61
Cost per invitation	\$7.17	\$2.25	\$1.35	262,334)		-
<i>Main survey</i>						
Completed on platform	21	56	217	389	-	683
Completed on Qualtrics	16	58	219	341	80	714
Passed both attentions	9 (56.3%)	38 (65.5%)	189 (86.3%)	325 (95.3)	75 (93.8%)	636 (89.1%)
Duplicates (of passed att.)	0	0	22 (10%)	0	1 (1.3%)	23 (3.6%)
Final set	9 (56.3%)	38 (65.5%)	167 (76.3%)	325 (100%)	74 (98.7%)	613 (85.9%)
Cost	\$56.91	\$210.62	\$928.76	\$1,357.66	\$247.93	\$2,801.88
Cost per response	\$6.32	\$5.54	\$5.56	\$4.18	\$3.35	\$4.57
<i>Total</i>						
Population size	9	38	167	325	74	613
Cost Screen + Main	\$415.39	\$507.68	\$1,285.83	\$1,357.66	\$247.93	\$3,814.49
Cost per valid response	\$46.15	\$23.53	\$9.25	\$4.18	\$3.35	-
<i>All passed REALCODE</i>						
Pass all five programming questions	0 (0%)	24 (63.2%)	14 (8.4%)	108 (33.2%)	66 (89.2%)	212 (34.6%)
Cost per programming skilled participant	-	\$21.15	\$91.85	\$12.57	\$3.76	-

Broader Impact

- Created a **foundational ground truth** for **reproducibility, comparisons, & cost-effective** research.
- Won **best paper** 🏆 award at the leading human-computer interaction conference.
- **16** subsequent research papers have drawn upon and expanded upon this work within **just 1 year** (as of August 2023).



Business illustrations by Storyset

Reflections - What I Learned?

- Investment: \$3000 for study
- **Explore secondary applications** of the data **prior** to study
- Promote its value to stakeholders



Growth Illustrations by Storyset

What Do Former Teammates Have to Say?

[Quotes from LinkedIn recommendations]

“efficient in **time management**, allowing him to keep the research projects **on track** and **deliver** the results **on time**, without losing the quality.” [Alisa Frik, Senior UXR]

“**highly professional and amiable** colleague . . . was involved in a number of projects, **worked with a colleagues at varying levels of seniority** and experience, and **acted as a mentor** for junior colleagues.” [Louise Evans, Research Manager]

“easily one of my **most productive** students. He has an **excellent eye for interesting research problems** and the **attention to detail** needed to realize them.”

[Kami Vaniea, Associate Professor]

Contact

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