

A Profile of U.S. Jobs from the survey of Skills, Technology, and Management Practices (STAMP)

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Current Debates

I. Earnings inequality growth

A. General theories

1. **Lean and mean:
Labor squeezed**
2. **Flexible specialization:
Teams & IT→rising skills**
3. **Human capital:
IT (SBTC) & Teams→rising skills**

B. Specific concerns

1. **IT competence, international competitiveness**
2. **"Good jobs, bad jobs" debate**
3. **Worker displacement, retraining**
4. **Racial/ethnic disadvantages**
5. **Welfare-to-work transitions, job readiness**
6. **Literacy, education reform, school quality**
7. **School-to-work transitions, youth job readiness**

Most or all make assumptions about

1. Skills
2. Information technology (IT)
3. Employee involvement (EI)

...but hard data are scarce despite years of debates

Data Gap

- A. How many jobs require what
 1. cognitive and other skills
 2. computer (IT) and other technology skills
 3. employee involvement (EI) practices?

Or, what is the skill profile of American jobs?

- B. To what extent are skills, IT, and EI causally related to one another (or at least complementary) ?

- C. How are the core variables (skills, IT, EI) related to

1. wages
2. other job characteristics
 - a. promotions
 - b. downsizing, outsourcing
 - c. pay and benefit cuts
 - d. unionization
 - e. effort intensity
 - f. job satisfaction

- D. What are the *trends* in

1. levels of skill, IT, and EI (A)
2. their interrelationships (B)
3. their relationships to other outcomes (C)

Measurement Philosophy

- Individual-level data to model relationships
- Objective, behaviorally concrete questions
- Externally meaningful response scales
 - goal:
 - natural units
 - real-world categories (e.g., math tasks, team duties)
 - avoid, if possible:
 - vague quantifiers
 - numbered rating scales
 - holistic ratings
- Detailed coverage of skills, technology, EI, and others
- Cover gradations across full range of population variability—avoid coarse scales, floor and ceiling effects
- Cover substantive content and use best methods from diverse disciplines
 - sociology
 - labor economics
 - industrial relations
 - education
 - occupational psychology
 - human resource management

Survey of Skills, Technology, and Management Practices (STAMP)

- Two-wave, refreshed panel (N = 2,304, wave 1)
- Sample reinterviewed after 3 years, plus new subsample
- Nationally representative, RDD telephone survey (2005)
- Employed wage & salary workers, age ≥ 18
- English & Spanish language versions
- 166 job-specific questions, 28 mins. average length
- Models: cross-sectional, fixed effects, career growth, trend analyses, test-retest reliabilities

STAMP Survey Content

Skill and Task Requirements

Cognitive skills

Math, reading, writing, document use

Problem-solving

Required education, experience, and learning times, training

Interpersonal skills

Physical job demands

Supervision, Autonomy, Authority

Closeness of supervision, autonomy, repetitiveness

Supervisory responsibilities

Policy-making authority

Computer and Other Technology

Computers

Frequency of use

Use of fourteen specific applications

Use of advanced program features

Job-specific and new software

Training times

Complexity of computer skills required

Adequacy of respondents' computer skills

Computer experience of non-users in prior jobs

Machinery and electronic equipment

Set-up, maintenance, and repair

Equipment and tool programming—NC/CNC, robots, PLC

Mechanical and electronics knowledge

Employee Involvement

Job rotation, cross-training, pay for skill

Formal quality control program

Teams: levels of activity, responsibilities, decision making authority

Bonus and stock compensation

Job Downgrading

Downsizing, outsourcing, technological displacement

Promotion opportunity

Work load, pace, and stress

Pay and benefits cuts

Strike activity

Job Satisfaction

Table 2. Math, Reading, Writing, and Document Use (percentage)

	All	Hi WC	Lo WC	Upper BC	Low BC	Service
Percentage (weight)	100	36.1	25.4	10.3	13.0	15.1
N (unweighted)	2,304	1,010	569	161	271	291
Math ($\alpha=0.81$)						
1. Any math	0.94	0.95	0.97	0.94	0.91	0.88
2. Add/subtract	0.86	0.93	0.90	0.87	0.78	0.73
3. Multiply/divide	0.78	0.89	0.82	0.81	0.65	0.57
4. Fractions	0.68	0.82	0.68	0.70	0.58	0.40
<i>Any more advanced</i>	0.22	0.35	0.09	0.41	0.19	0.04
5. Algebra (basic)	0.19	0.30	0.08	0.36	0.16	0.04
6. Geometry/trig	0.14	0.20	0.05	0.29	0.15	0.02
7. Statistics	0.11	0.22	0.05	0.10	0.06	0.02
8. Algebra (complex)	0.09	0.14	0.03	0.16	0.08	0.02
9. Calculus	0.05	0.08	0.01	0.08	0.05	0.01
Reading ($\alpha=0.80$)						
1. Any reading	0.96	0.99	0.97	0.91	0.91	0.95
2. One page	0.82	0.96	0.86	0.72	0.57	0.67
3. Five pages	0.54	0.81	0.47	0.46	0.26	0.32
4. News articles	0.42	0.64	0.37	0.27	0.21	0.24
5. Prof'l articles	0.38	0.65	0.26	0.24	0.15	0.23
6. Books	0.53	0.76	0.40	0.53	0.35	0.38
Writing ($\alpha=0.64$)						
1. Any writing	0.91	0.99	0.93	0.83	0.80	0.83
2. One page	0.61	0.86	0.56	0.46	0.36	0.41
3. Five pages	0.24	0.47	0.13	0.12	0.07	0.09
4. News articles	0.09	0.20	0.04	0.01	0.04	0.03
5. Books/prof'l arts	0.03	0.07	0.00	0.00	0.00	0.02

Table 3. Distributions of Educational Attainment and Required Education, and Rates of Mismatch (percentage)

Aggregate distribution	Attained	Required	A – R
<HS	9.0	7.6	1.4
HS	25.9	42.6	-16.7
HS+voc	5.7	6.3	-0.6
<BA	29.1	16.5	12.6
BA	20.0	20.8	-0.8
Grad	10.3	6.3	4.0
Individual matches	All	30≤Age≤59	
Under-educated	13.2	14.1	
Matched	55.3	57.4	
Over-educated	31.5	28.6	

Table 4. Trends in education required by job 1969-2005
(percentage)

	SWC/QES			PSID		STAMP
	1969	1972	1977	1976	1985	2005
< HS	36.1	24.3	21.4	27.0	13.2	6.0
HS	25.6	43.7	43.9	42.5	40.0	39.3
HS+Voc	12.6	--	--	--	6.1	6.3
< BA	9.0	14.4	17.1	7.9	10.2	17.1
BA	10.2	9.8	10.6	17.1	23.4	23.8
Grad	6.6	7.8	7.0	5.5	7.1	7.5
N	1,033	982	861	3,250	4,509	1,885

Samples restricted to workers over 25 working at least 20 hours per week for comparability. All figures use sample weights.

Sources: Survey of Working Conditions (1969), Quality of Employment Surveys (1972, 1977), and Panel Study of Income Dynamics (1976, 1985), Survey of Skills, Technology, and Management Practices (2005)

**Table 5. Specific human capital:
experience, learning times, and formal training**

	Percentage
Prior experience required	
None	21.8
< 1 year	14.8
1-2 years	27.1
3-5 years	20.3
>5 years	15.9
Job learning times	
<1 week	5.3
1-4 weeks	21.6
1-6 months	27.3
6-12 months	23.9
> 1 year	21.8
Classroom training, in 3 yrs.	
Any	44.0
Read, write, math	11.8
Customer service	17.1
Management	19.4
Communication	21.7
Quality control	10.3
Other technical	25.8

Note: All training refers to formal classroom training paid or provided by employers.

Table 8. Computer use

	All	Hi WC	Lo WC	Hi BC	Lo BC	Service
Computers						
Data entry most of time	0.14	0.14	0.31	0.00	0.04	0.03
Spreadsheets	0.40	0.64	0.44	0.13	0.18	0.14
Spreadsheet macros, equations	0.12	0.21	0.11	0.02	0.06	0.03
Databases	0.19	0.32	0.20	0.07	0.07	0.03
SQL queries	0.03	0.08	0.01	0.01	0.01	0.01
CAD	0.07	0.10	0.05	0.05	0.06	0.02
Science/engineering tasks	0.07	0.14	0.03	0.04	0.04	0.02
Programming	0.04	0.08	0.02	0.00	0.01	0.01
Special software	0.47	0.61	0.59	0.23	0.29	0.24
New software in last 3 years	0.16	0.24	0.16	0.11	0.12	0.06
No. of applications (0-15)	4.02	6.06	4.68	1.68	1.91	1.41
Computer skill level ^a	4.21	5.91	5.06	1.95	2.43	1.77
Inadequate skills (users only)	0.23	0.26	0.18	0.30	0.23	0.22
Affected pay/promotion	0.08	0.03	0.05	0.10	0.18	0.13

Note: All statistics calculated from total sample unless noted.

Table 9. Mechanical and other technology

	All	Hi WC	Lo WC	Hi BC	Lo BC	Service
Machine technology						
Heavy Machinery	0.20	0.07	0.11	0.65	0.46	0.12
Maintenance	0.10	0.03	0.01	0.41	0.21	0.10
Repair	0.08	0.03	0.01	0.35	0.16	0.07
Set-up	0.12	0.04	0.04	0.41	0.29	0.08
Machine tools	0.04	0.01	0.01	0.12	0.14	0.02
Use NC/CNC	0.02			0.03	0.09	
Program NC/CNC	0.01				0.06	
Industrial robots	0.01		0.01	0.02	0.03	
Program robots				0.01	0.01	
Programmable logic controller	0.02	0.01		0.06	0.04	
Computerized process control	0.04	0.03	0.02	0.14	0.12	
Program CPC	0.01	0.01		0.04	0.03	
Automated equipment	0.05	0.02	0.02	0.09	0.19	0.01
Assembly line	0.02		0.01	0.05	0.12	
New machinery in last 3 years	0.10	0.04	0.04	0.32	0.23	0.06
Training time >1 week	0.04	0.01	0.02	0.13	0.12	0.01
Mechanical Skill Level ^a	2.50	1.73	1.38	5.97	4.55	2.12
Electronics Skill	0.13	0.12	0.08	0.33	0.15	0.09

Note: Blank cells have values less than 0.01.

a. Mechanical skills: 0=very basic, 10=very complex

Table 10. Employee Involvement Measures

	All	Hi WC	Lo WC	Hi BC	Lo BC	Service
Job rotation	0.53	0.43	0.64	0.48	0.60	0.57
Pay for skill	0.10	0.06	0.11	0.08	0.16	0.16
TQM/QC	0.20	0.22	0.21	0.17	0.19	0.15
Team member ^a	0.26	0.27	0.21	0.28	0.25	0.26
<i>Team duties</i> ($\alpha=0.69$)						
Job assignment	0.20	0.22	0.17	0.26	0.17	0.22
Task scheduling	0.18	0.21	0.14	0.19	0.15	0.19
Worker schedules	0.09	0.07	0.08	0.14	0.10	0.13
Change methods	0.18	0.20	0.15	0.22	0.19	0.16
New equipment	0.18	0.19	0.14	0.25	0.18	0.17
Select leader	0.08	0.10	0.05	0.13	0.08	0.04
Monitor quality	0.17	0.19	0.13	0.19	0.18	0.13
Monitor cost	0.11	0.12	0.11	0.14	0.12	0.09
Cross-dept. communication	0.20	0.22	0.17	0.21	0.19	0.17
Performance review	0.11	0.11	0.09	0.17	0.10	0.13
No. of team functions (0-10)	1.41	1.49	1.21	1.81	1.44	1.26
No. of team functions (0-10)	5.77	5.63	5.79	6.56	5.75	5.51

Note: All statistics based on full sample except last line. Cronbach's α for team items calculated on sub-sample of team members only. Managers ineligible for team items and coded as zero for calculations.

Table 11. Downsizing, outsourcing, technological displacement

	All	Hi WC	Lo WC	Hi BC	Lo BC	Service
Δ employment in last 3 years						
<i>Lot less</i>	0.06	0.06	0.04	0.08	0.12	0.03
<i>A little less</i>	0.12	0.12	0.14	0.14	0.10	0.09
<i>About same</i>	0.50	0.48	0.47	0.52	0.47	0.60
<i>More</i>	0.33	0.35	0.35	0.25	0.12	0.29
Permanent layoffs	0.08	0.07	0.07	0.07	0.16	0.05
Outsourcing	0.04	0.03	0.03	0.05	0.13	0.02
Personally laid off, last 3 years	0.10	0.07	0.10	0.15	0.16	0.10
Replaced by machine	0.00				0.01	0.01
Ever on strike	0.03	0.02	0.02	0.08	0.07	0.02

Note: Blank cells have values less than 0.01.

Table 12. Correlations of STAMP occupational means and O*NET Scores

Math	0.68
Verbal (read, write)	0.85
Problem solving	0.65
Autonomy	0.60
Policy making	0.67
Repetitiveness	0.34
Interpersonal	0.79
Physical demands	0.88
Mechanical	0.67

Extensions

- Possible future waves—social indicators for trend-monitoring
- Possible link to employer data
 - Organizational structure, strategy, resources
 - Employer policies (promotion, training)
 - Employer-perceived skills gaps
 - Technology
 - Employee involvement practices
- Link to employee test scores—e.g., PIAAC
 - Improve understanding of relationship between scores and job functions
 - Important adjustment in analyses, e.g., measuring under- and over-education
 - International comparisons