COLLABORATION AND COGNITIVE SKILLS IN THE WORKPLACE: RESULTS FROM THE PIAAC SURVEY

TOBIN LOPES
ELLEN SCULLY-RUSS
JILL ZARESTKY
JOSHUA C. COLLINS
TEAMWORK AND LEARNING ... WORKS?

- What we know about collaboration at work and its connections to learning and development is mixed
  - Teamwork leads to higher levels of learning, but this may be due to confirmation bias
  - Team dynamics may inhibit learning
- Collaborative learning leads to increased critical thinking – but is related to education
LEARNING INTENSITY OF JOBS

Characteristics and features of jobs that foster a high degree of learning (Skule, 2014; Billett, 2004):

• Task characteristics of jobs (Kim, et al, 2015, Marsick & Watkins, 2014; Rausch, 2013);

• Knowledge characteristics of jobs (Yang, Marsick and Watkins, 1998; Rausch, 2013);

• Social characteristics of jobs (Marsick & Watkins, 2014; Rausch, 2013; Skeul, 2014; Yang, Marsick, & Watkins, 1998);

• Contextual characteristics of jobs (Kim et al, 2015, Marsick & Watkins, 2014; Skule, 2014;).
<table>
<thead>
<tr>
<th><strong>Social Characteristics of Jobs</strong></th>
<th><strong>Questions</strong></th>
</tr>
</thead>
</table>
| Team learning, spirit of collaboration and collaborative skills (Yang, et al, 1998) | D_Q13a: how often do you learn from peers and supervisor  
F_Q02b: Teaching others |
| Assistance in performing tasks (feedback, etc.) (Rausch, 2013) | |
| High degree of exposure to the demands of others (Skeul, 2014) | F_Q01b: percent of time working cooperatively with others  
F_Q02a: Sharing information |
| Inquiry and dialogue (Yang, et al, 1998)  
Openness and accessibility of people (Marsick & Watkins, 2014) | |
| Work across boundaries (Marsick & Watkins, 2014)  
Extensive professional contacts (Skeul, 2014) | F_Q02c,d: how often make speeches/presentations, sell products/service  
F_Q04b: negotiate with people in and out of firm  
G_Q05h: participate in discussions on the internet |
| Informal/tacit communications (Marsick & Watkins, 2014)  
Tacit communication with supervisor (Kim, et al, 2015)  
Tacit communication with co-workers (Kim, et al, 2015) | G_Q05h: participate in discussions on internet |
A CLEARER PICTURE THROUGH PIAAC?

• Our Central Questions:
  • What is the relationship between collaboration/cooperation at work and information-sharing and Literacy, Numeracy, and PS-TRE?
  • What is the relationship between skills use at work and Literacy, Numeracy, and PS-TRE?
• Focused on eight U.S. sectors adding new jobs in the next 10 years
THE SECTORS – LARGEST EMPLOYMENT GROWTH

- Accommodation & Food Service
- Administrative & Support service
- Construction
- Education

- Financial & Insurance
- Human Health & Social Work
- Public Administration & Defense
- Wholesale & Retail Trade
OUR MODELS

\[ \text{PIAAC/Skills} = \mu + \beta_1 \text{ED} + \beta_2 \text{COLL} + \beta_3 \text{INFO} + \beta_4 \text{GENDER} \]

- PIAAC = Three PIAAC Scores – Literacy, Numeracy, PS-TRE
- Skills = Skills at work: Read, Numeracy, Write, ICT
- ED = Education level
- COLL = Frequency of collaboration at work
- INFO = extent that one shared work-related information
- GENDER = Binary (Male, Female)
### Significant Linear Regression Coefficients between PIAAC Skills and Cooperation/Collaboration and Information Sharing

<table>
<thead>
<tr>
<th>Industry</th>
<th>Acronym used</th>
<th>Literacy</th>
<th></th>
<th>Numeracy</th>
<th></th>
<th>PS-TRE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Time Cooperating/Collaborating</td>
<td>Sharing Work-related information</td>
<td>Time Cooperating/Collaborating^a</td>
<td>Sharing Work-related information</td>
<td>More than 1/2 the time</td>
<td>All the time</td>
</tr>
<tr>
<td>All Industries</td>
<td></td>
<td>-16.12*</td>
<td>13.19*</td>
<td>-19.15*</td>
<td>12.16*</td>
<td>-13.53*</td>
<td>9.65*</td>
</tr>
<tr>
<td>Accommodation and food service</td>
<td>AFS</td>
<td>23.42*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative and support service</td>
<td>AdSupp</td>
<td>-25.91*</td>
<td>-28.05*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Construction</td>
<td>22.41*</td>
<td>20.73*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Industries</td>
<td></td>
<td>-18.53*</td>
<td>17.62*</td>
<td>-21.44*</td>
<td>16.42*</td>
<td>-13.88*</td>
<td>10.28*</td>
</tr>
<tr>
<td>Human health and social work</td>
<td>FI</td>
<td>-13.44*</td>
<td>27.20*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public administration and defense; compulsory social security</td>
<td>HHS</td>
<td>-13.44*</td>
<td>27.20*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Industries</td>
<td></td>
<td>-17.94*</td>
<td>13.96*</td>
<td>-21.23*</td>
<td>13.03*</td>
<td>-15.20*</td>
<td>10.18*</td>
</tr>
<tr>
<td>Wholesale and retail trade; repair of motor vehicles and motorcycles</td>
<td>WRT</td>
<td>-22.84*</td>
<td>23.34*</td>
<td>-27.22*</td>
<td>21.33*</td>
<td>-22.68*</td>
<td>16.47*</td>
</tr>
</tbody>
</table>
Summary of Significant Linear Regression Coefficients between Skills Use at Work and Cooperation/Collaboration and Information Sharing

<table>
<thead>
<tr>
<th>Industry</th>
<th>Acronym used</th>
<th>Time Cooperating/Collaborating</th>
<th>Sharing Work-related information</th>
<th>Reading Skill Use</th>
<th>Writing Skill Use</th>
<th>Numeracy Skill Use</th>
<th>ICT Skill Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodation and food service</td>
<td>AFS</td>
<td>0.39*</td>
<td>0.44*</td>
<td></td>
<td></td>
<td></td>
<td>-0.21*</td>
</tr>
<tr>
<td>Administrative and support service</td>
<td>AdSupp</td>
<td>0.37*</td>
<td>0.38*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Education</td>
<td>0.45*</td>
<td>0.46*</td>
<td>0.26*</td>
<td></td>
<td></td>
<td>-0.10*</td>
</tr>
<tr>
<td>Financial and insurance</td>
<td>FI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human health and social work</td>
<td>HHS</td>
<td>0.26*</td>
<td>0.50*</td>
<td></td>
<td>0.64*</td>
<td>0.52*</td>
<td></td>
</tr>
<tr>
<td>Public administration and defense; compulsory social security</td>
<td>PubAdmin</td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholesale and retail trade; repair of motor vehicles and motorcycles</td>
<td>WRT</td>
<td>0.26*</td>
<td>0.35*</td>
<td>0.31*</td>
<td>0.29*</td>
<td>0.39*</td>
<td></td>
</tr>
</tbody>
</table>

Statistically significant but there doesn’t appear to be a practical difference.
FINDINGS: RESEARCH QUESTION 1

• Negative correlation to all three PIAAC measures of competencies for those who cooperate all the time as compared to those who cooperate sometimes.

• Those who shared information once a week or more had a positive association with PIAAC competencies with varying degrees across industries and particular competencies.
FINDINGS: RESEARCH QUESTION 2

• Cooperation/collaboration at work and sharing work-related information were largely positively related to various skills use, although the extent of the relationship varied by industry.

• Sharing work-related information was positively related to the use of specified skills across industries while collaborating at work was only related to skills use in four of eight industries – Construction, Education, HHS, and WRT.

• Education level was positively correlated to many of the measures of skills use
CONCLUSIONS

• Collaboration does not foster literacy, numeracy, and problem-solving – it may impede development; or people who develop themselves don’t collaborate in comparison

• Education, not work structures or conditions, are key determinants of cognitive skills as measured by PIAAC

• Teams have been viewed as development opportunities when the opposite seems to be supported by this study
IMPLICATIONS

• More strategic and deeper consideration of the links between social interactions (Teams) and collaboration as a development tool for cognitive skills

• Consideration of the work teams do
  • Don’t assume such work leads to cognitive skills development
AUTHOR CONTACT INFORMATION

TOBIN LOPES: TOBIN.LOPES@COLOSTATE.EDU
ELLEN SCULLY-RUSS: SCULLYRU@GWU.EDU
JILL ZARESTKY: JILL.ZARESTKY@COLOSTATE.EDU
JOSHUA C. COLLINS: COLLINSJ@UMN.EDU