WORKING, EARNING, LEARNING IN THE AGE OF INTELLIGENT TOOLS

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Implications for Education and Lifelong Learning

Andreas Schleicher

- The Industrial Revolution put technology ahead of people. Then with universal public school, people were put before technology. Now, will technology dominate people? Is there nothing left for people in the digital age?
    - o Race between tech and education
- In different countries, there are similar job trends.
- Tasks are impacted by automation in different ways, which have various implications on skill training.
    - o Variations within occupations in terms of different relevant skills
- Technology is changing the task composition of jobs and the ways that we work.
    - o It can make our workplaces more skill intensive- product of more digital exposure
- People's problem-solving skill level decline as years increase since "leaving education."
    - o Longer digital exposure is showing people's skills improving
- In ICT intensive environments, learning from coworkers and learning by doing is more likely to occur. Thus, the structure of workplace matters; learning is related to the structure of the workplace.
    - o Learning by doing
    - o Question is are countries prepared for this scale of change
- Older people do not have good digital literacy skills. In the younger generation, only half of the population has the skillset to manage complex digital information (i.e. opening files, navigating various simple computer functions, etc.).
    - o In Singapore, 3% of older population has digital literacy skills, but the younger generation has the highest digital literacy skills of any country surveyed.
- What role can education play?
    - o Qualifications don't equate to skills. There is inflation in degrees received, but not matched increase in skill accumulation. This implies that formal qualifications are limited in what they can tell us about skills that people have.
- Explanations:
    1. People keep learning (i.e. after HS keep learning, but don't go to college).
    2. People lose skills.

- <u>Digitalization increases the need for training, especially for low skill workers</u>. However, low skilled workers are less likely to participate in training or up-skilling. People with lower skills don't see the need, have the motivation, have the capacity to acquire new skills, etc. Employers less likely to invest in people who promise lower returns.
- Windows for skill building: need to talk about when to start skill building – perhaps earlier in life. If we don't get this right at the beginning, it only becomes increasingly difficult later in life.
- One study looks at student capacity to think like a scientist. This study suggests that poverty is not destiny – heterogeneity of achievement gap demonstrates the potential of what policy could be doing to moderate the impact of social background. For example, the 10% poorest children in Shanghai do better in math than the 10% wealthiest (not smartest) children in US.
  - Education is only a PROXY for skills
    - We put a lot of emphasis on epistemic/scientific thinking skills
    - Social and emotional skills are increasingly important
- People worry about training workers and then having them leave. But it is more expensive to not train workers and have them stay.
- Main take-away:
  1. There must be high quality initial education and lifelong learning. The returns are highest to early childhood education.
  2. Make learning engage everyone (i.e. employers, employees, etc.).
  3. Create effective links between learning and working (i.e. employer engagement in employee work)
     a. Do not just fill short-term need, but incentivize them for long-term skill development
  4. Allow worker discretion to adapt learning to their lives (i.e. content and delivery method); Singapore provides a fund upon birth for education that can be allocated however an individual chooses.
  5. Identify those who can benefit from learning most.
  6. Improve transparency (i.e. let people know what skills they have vs. what skills are demanded by the labor market).
  7. Guidance (i.e. data on supply and demand of skills that is timely).
  8. Flexible labor market arrangements.
  9. Help employers make better use of worker skills.
  10. Help economies move up the value chain (i.e. low to high skill equilibrium).

Lee Rainie

- In May, Pew conducted a representative survey of 4,000 adults who are online regarding their attitudes toward automation.
  - Americans have a like/wary relationship with technology
- Asked questions, including: what is technology doing for you at the moment?
- For people in advanced careers, technology has made work more interesting and more difficult (in an enhancement way).

- People with higher levels of education are more enthusiastic about changes due to technology.
- 24% of people have a lot of understanding of machine capacity in the economy, 61% have a little understanding.
  - Generally people are wary about this future rather than enthusiastic
- People expect greater inequality, fewer jobs, difficulty finding jobs, less economic efficiency, difficulty finding human-centric, meaningful jobs.
  - People prefer that machines do dangerous jobs.
- People would pay more to interact with a human, and believe that UBI would be helpful (partisan breaks).
- Who is responsible for displaced workers?
  - Government (according to democrats).
- Should there be limits on jobs businesses can replace with machines? Those with a college degree said no, others said yes.
  - Strong support for policies that limit the impact of automation; more support for national service jobs
- Only 7% thought their job could be completely automated. This implies that most people believe that their job is irreplaceable.
- In last year's survey, 87% of workers said that they **think training is an important part** of work.
- The majority of Americans believe individuals are responsible for themselves in job transitions; responsible for developing new skills
- 73% of Americans think of themselves as lifelong learners. 63% of workers did some type of skill upgrading (in the past ???). Many up-skilled for <u>social issues</u> (i.e. to stay updated on subjects their kids were learning!), altruistic reasons

Niels C. Nielsen

- In the world today, there are 65 million refugees. Many of them are children who receive no formal education.
- There are 600 million children and young people receive no education.
- Jordan: There are 2 million refugees absorbed into Jordan, most of them are living in critical conditions
- became determined to create scalable, quality education for refugee children:
- scale problem and solution- SCALE IS EVERYTHING
  - How to produce scalable, affordable, high quality education?
    1. Important to manage education and allocation of funds
       a. For example, in Malawi, 45% of teachers being paid did not exist.
    2. Certification is important. Decided to go biometric (using an iris scan). This way, children can be identified without any documents from anywhere in the world.
    3. When a child studies something in one country, their progress is not carried over when they move to another country. To overcome this challenge, WRS maps curriculum so that progress can be verified regardless of location.

4. Digital education content is a mess. It is fragmented. WRS is creating a global digital content repository (it will be published in 2018). The digital content repository will have a curation function, ability to tag content with learning outcomes, students and teachers can review the curriculum, etc. An AI algorithm will be developed to improve the program.

- Technology solves some problems, but <u>having good teachers is very important</u>. It is possible to train teachers while the teacher is teaching.
- Currently, there are 300,000 students in WRS programs in Jordan and Turkey. Almost all of the students are Syrian.
- Students are recruited through partners.
- In the next year, WRS has the funding to scale and increase capacity to 1 million students.
- We cannot solve the problem through providing education, rather through intelligent augmentation of technologies that help individuals and empower teachers.
- So far, WRS only has anecdotal evidence of impact.

Stephanie Jamet

- Education and training policy given fiscal constraints.
- What skills are needed to move to a new occupation?
  - Sheds light on the relationship between the end of formal education and ongoing on-the-job learning
  - Look at portfolio of skills: <u>cognitive skills are developed through initial education</u> while <u>specific skills are developed on the job</u>
- measure of the <u>distance between skills in distinct occupations</u>.
  - Skill distance is calculated by:
    1. <u>Skill shortage</u> in moving from occupation A → B; take the weighted sum
    2. <u>Skill excess</u> in moving from occupation A → B; take the weighted sum
- Skill distances are aggregated in a matrix for 127 occupations.
- Managers and professionals have a smaller skill distance in moving jobs, while elementary occupations have a larger distance.
- The study looks at average shortage within a groups of occupations in general cognitive skills vs. specific skills; find that low skilled have smaller shortage, while higher skilled have larger shortage.
- Implications for polarization: workers may resort to lower skilled occupations, thus increasing inequality.
- The shortage in cognitive skills is driven by <u>numeracy skills</u> rather than literacy or readiness to learn
- In both general cognitive skills and specific skills, lifelong learning is important.
- Low skilled occupations have a large distance from high skill occupations, but switches within low skill occupation groups may involve relatively small reskilling. Mobility within high skill occupations involves lots of reskilling requirements.
- The next step is to merge information on distances with estimates on risk of automation.

Hanne Shapiro

- Lack of incentive for low skill workers to upskill
    - Need to have the opportunity to use the skills they may acquire in training
- Rethinking non-demand
- Not just a supply issue; Access is not enough
- We need to rethink policy coordination
    - Intermixed firms, less restrictive

Claire Tomlin

- My research focuses on safe automation.
- The National Academies conducted a study in 2015-2016: Information Technology and the US Workforce: Where are we and where do we go from here?
- The study was based on two workshops and a report. It found that:
    1. There is lack of data on the scope and rate of growth of key technologies (i.e. AI).
    2. Lack of data on labor market implications of key technologies.
    3. Recommends an AI index that tracks the pace and spread of AI technology. The index should be combined with data on skills and tasks in different occupations to guide skill and job training.
    4. Public-private partnership is required.
- Rather than the "predict and plan" approach, we must follow the change of the companies and "sense and respond"; for example, A/B testing, whereby we rapidly test ideas and react accordingly (i.e. if you triple prices in China, more people want the product)
- If you are on LinkedIn you are high skilled, not a truck driver.
- Why would companies be incentivized to participate in this data driven analysis? CEOs are interested in AI index.
- A lot of info is hard to get or not available
- Steps to creating an AI index:
    1. Collect the data.
    2. Integrate the data and statistical properties of the data from diverse sources with existing core properties.
- Create index to track where technologies are currently and where we expect to them to be in the next year at the sector level (short term)

Mary Walshok

- Problems are resolved at the regional level.
- Universal access to high quality continuous education is the answer to displacement and inequality that 21st century technologies represent.
- If you live in a community with only a few businesses, they will not do retraining alone, but they will collaborate.
- I have studied Pittsburg, Chicago, NYC, Navy, and Veterans transitioning to jobs.
- Libraries are becoming skill certification centers for communities.

- o Need universal access to high quality ongoing education
- There is web of social institutions at the regional level (i.e. libraries, community colleges) that can come together to deliver education and training to previously underserved populations on topics that are important and relevant.
    - o Will allow for inter-generational social mobility
    - o Highly collaborative work and education system
- Track enrollments and find that they are correlated with the regional jobs (i.e. UC Davis agriculture program and wine, UCSD and life sciences, UCLA and entertainment)
- Principles to inform practice:
    1. Technology and globalization affect all jobs. We must increasingly think about employability, not just jobs. We don't design undergraduate and graduate training programs around employability (employability is sectorial not general).
    2. We must think about sectors not just general training.
- Research universities can be partners to inform local conversations and policy.
- Skill bundling: people need more than just language and culture skills, they also need the ability to move across sectors.
- People need multiple stackable credentials that can be gained through formal training and experience.
- We have examples of education and training models that work.
- What's missing in the conversation is the failure to landscape in any way what's already happening in education and training that works