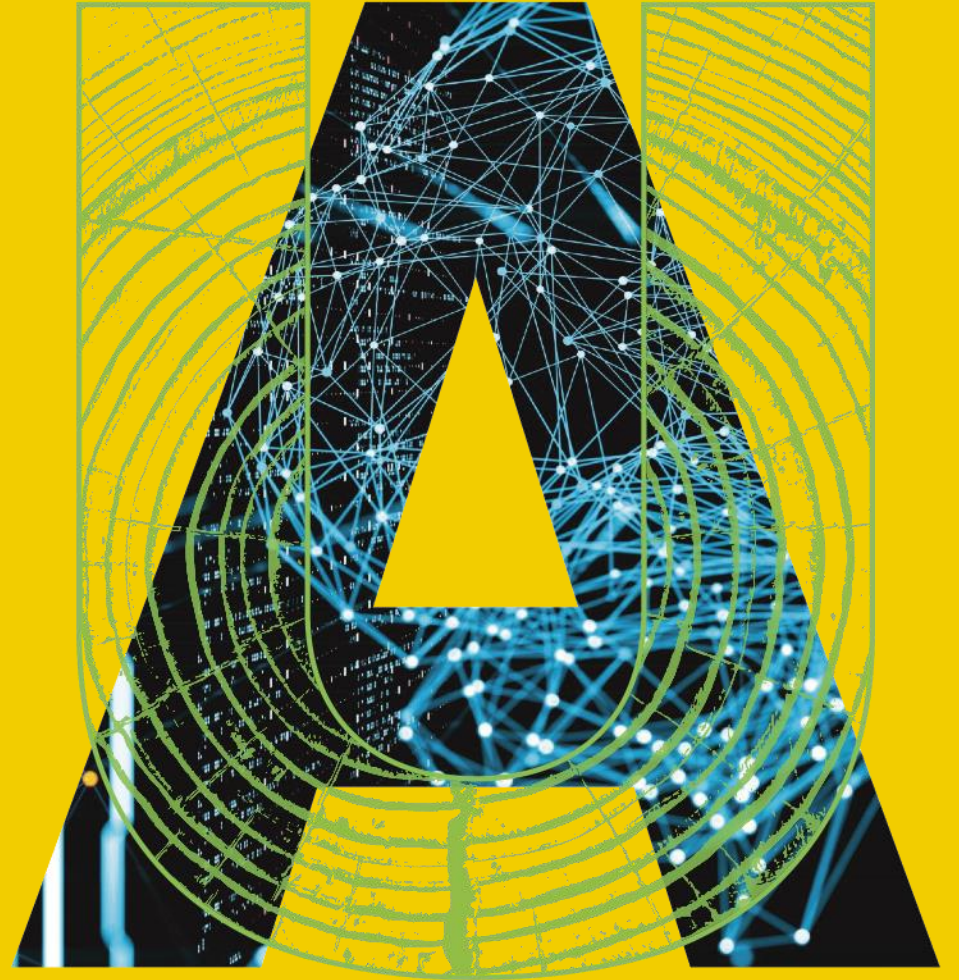


MEASURING THE DEMAND FOR SKILLS IN ALBERTA

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ESNA, DEC. 2022



**UNIVERSITY
OF ALBERTA**



Background: Premier's Council on Skills

Sep. 6: Alberta announces Premier's Council on Skills

- **“Mandate: The council, comprised of 11 key industry stakeholders, will provide advice to the Premier, through the Minister of Advanced Education, to strengthen post-secondary programming and align Alberta with current and future industry demand.”**
- **According to former Premier Kenney, the Council will “help government ensure that the current and future post-secondary programming in Alberta is aligned with the needs of our high-demand sectors.”**
- **“We are hearing... from employers that the biggest challenge they are facing is skill and labour shortages.... Not enough people with the right skills for the jobs that are being created right now in our province.”**
 - **Hering, J. (2022, Sep. 6). Alberta taps industry heads to advise on post-secondary needs. Calgary Herald.**
<https://calgaryherald.com/news/politics/alberta-taps-industry-heads-to-advise-on-post-secondary-needs>

A data-driven approach

- **How to measure skill demand in Alberta?**
- **How to measure the supply of skills?**
- **How to identify skill supply-demand imbalances?**
- **How to identify the programs (i.e., post-secondary, trades, etc.) associated with the workers possessing skills?**

Traditional approaches to measuring skill demand

1. Vacancy analysis by occupation

- **Job Vacancy and Wage Survey (JVWS):** quarterly vacancies by industry, occupation, education, experience & location
- **Identify “tough to fill” vacancies**

2. Associating vacancies with skill requirements using O*Net

- **O*Net:** measures the importance of different domains of knowledge, skills, abilities, activities and tasks in close to 1,000 occupations
- **At the national level, the non-profit Labour Market Information Council (LMIC) in Canada is working to link vacancies to skill requirements using O*Net to determine Canada’s skill requirements**
- [LMI Insights Report No. 35 \(Sep. 2020\)](#)



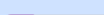
O*NET

- **Developed in 2001 by the US Dept. of Labor to replace the Dictionary of Occupational Titles. Primary source of occupational information in US.**
- **923 standard occupational classification (SOC) occupations.**
- **Surveys workers on hundreds of knowledge domains, skills, abilities, activities and tasks**
- **Indicates both the “level” of the skill required and its importance**

Speaking






























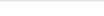
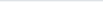

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Talking to others to convey information effectively.

- Level examples:**
- 85  Argue a legal case before the Supreme Court
 - 57  Interview applicants to obtain personal and work history
 - 28  Greet tourists and explain tourist attractions

873 occupations shown

Show Job Zones:

Importance 	Level 	Job Zone 	Code 	Occupation 
94 	70 	5	25-1111.00	Criminal Justice and Law Enforcement Teachers, Postsecondary  Bright Outlook
94 	68 	5	25-1051.00	Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary
91 	71 	5	25-1112.00	Law Teachers, Postsecondary 
91 	71 	5	25-1065.00	Political Science Teachers, Postsecondary 
91 	70 	5	25-1081.00	Education Teachers, Postsecondary 
91 	70 	5	23-1011.00	Lawyers 
91 	70 	5	25-1113.00	Social Work Teachers, Postsecondary 
91 	68 	5	25-1121.00	Art, Drama, and Music Teachers, Postsecondary 
91 	68 	5	21-2011.00	Clergy
91 	68 	5	25-1067.00	Sociology Teachers, Postsecondary 

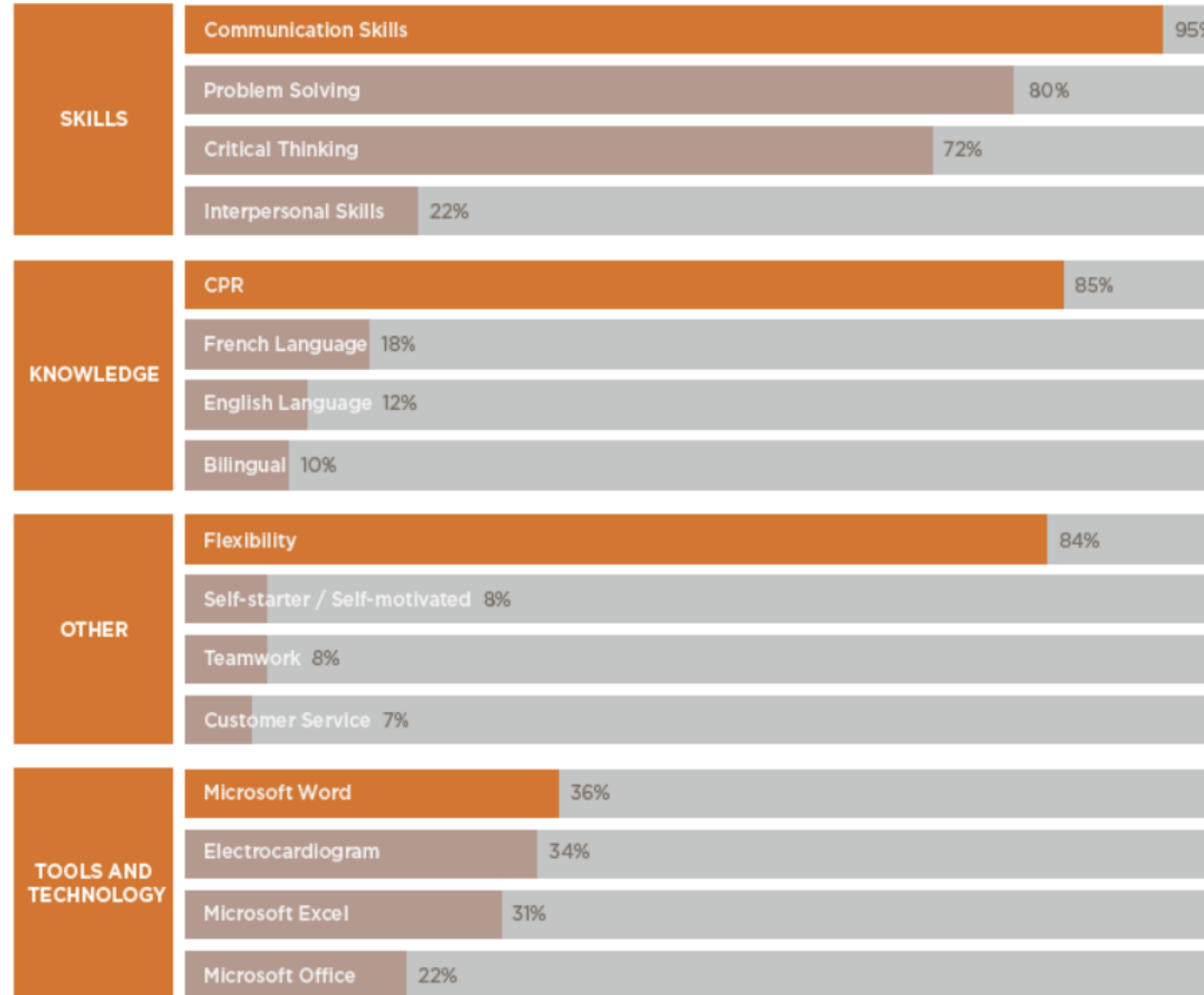
Limitations of O*NET

- 1. Updated on an annual basis, but only about 100 occupations per year**
- 2. Limited/static set of occupations**
- 3. Merging to vacancy data requires assuming that all jobs in an occupation have the same requirements**
- 4. Finite set of skill requirement measures**

Measuring skill demand in the Big Data era

- **Use natural language processing (NLP) machine learning (ML) techniques to identify the skill requirements in online job postings**
 - **Replicate O*NET measures using job posting data (e.g., Djumalieva and Sleeman [2018] and Lassébie et al. [2021])**
- **Advantages:**
 1. **Skill requirement measures can be updated in near-real time**
 2. **Skill requirements can be identified by location (e.g., Alberta)**
 3. **Skill requirements measured at the job (rather than occupation) level**
 4. **Flexible (relative to O*NET worker surveys) measurement of skills**

Figure 1. Communication, CPR, flexibility, and Microsoft Word top the work requirements for registered nurses and psychiatric nurses (NOC 3012) in Winnipeg (2019).



Source: [LMI Insight Report no. 32, Through the Looking Glass: Assessing Skills Measures Using 21st Century Technologies \(June 2020\)](#)

Alberta's advantage in the Big Data era

- **World-class NLP ML researchers at U of Alberta**
- **Experts on job ads—both in the Econ dept and among the NLP ML researchers**
- **Experts on the labour market**
- **Collaboration can facilitate flexible measurement of skills—including those not captured by O*NET/data providers**
- **Example: measuring the demand for personality traits (Brenčič & McGee [2022])**
 - **31% of job ads indicate a need for extroverted workers, 26% for conscientious workers, and 21% for workers who are open-to-experience**

Top 5 occupations by personality requirements

Extroversion	Conscientiousness	Openness	Agreeableness	Emotional Stability
<i>Photographers (189)</i>	Clergy and religious workers (176)	Clergy and religious workers (176)	Clergy and religious workers (176)	Waiters and waitresses (435)
Miscellaneous food preparation and service workers (444)	Technical writers (184)	Insurance sales occupations (253)	<i>Kindergarten and earlier school teachers (155)</i>	<i>Airplane pilots and navigators (226)</i>
Chief executives, public administrators, and legislators (4)	Management support occupations (37)	Fire fighting, fire prevention, and fire inspection occs (417)	<i>Photographers (189)</i>	Insurance sales occupations (253)
<i>Interviewers, enumerators, and surveyors (316)</i>	<i>Proofreaders (384)</i>	Actuaries (66)	<i>Bakers (687)</i>	Respiratory therapists (98)
<i>Managers of medicine and health occupations (15)</i>	Industrial engineers (56)	<i>Kindergarten and earlier school teachers (155)</i>	Social workers (174)	General office clerks (379)

Measuring skill demand-supply mismatch

- **Job postings indicative of the skills sought by employers but not the availability of skills in workforce**
- **Massive movement of resumes online through LinkedIn and job boards**
- **In principle, similar NLP ML methods could be applied to measure the availability of skills among workers, job seekers**

Observing skill development pathways

- **Resume/LinkedIn data can be used to associate post-secondary/professional/trade programs with the skills of workers to identify skill development pathways**
 - **Can't be done with conventional Statistics Canada data sets**
- **Useful for informing skill development/recruitment strategies for filling identified skill gaps**
 - **Importance of international and interprovincial migration**
 - **Importance of post-secondary programs and trade/apprenticeship programs**

Data Availability/Feasibility

- **Firms like Lightcast, Vicinity Jobs, Talent Neuron scrape both online job postings and resume/LinkedIn data**
- **Most of the above firms offer consulting services concerning supply-demand gaps**
- **Skill measures, however, are proprietary and thus a black box. U of Alberta researchers could provide more of an “open source” approach to skill measurement**

Limitations of the Big Data approach

- **How to measure supply-demand imbalances:**
 1. **Are workers on LinkedIn employed or looking? Job postings reflect a flow of skill demands—not the stock**
 2. **Geographic region defining the potential supply of skill**
 3. **Some job postings may be easily filled, others may require more time.**
- **Some jobs/occupations/industries not well-represented online**
- **Which skills matter most?**
- **Skills self-reported on LinkedIn/resumes**

Concluding thoughts

- **Tough-to-fill vacancies in particular occupations have historically been used to identify labour market supply-demand imbalances**
- **Post-secondary programs, however, produce skills rather than occupations per se**
- **Big Data can facilitate**
 1. **Real-time measures of provincial skill demands**
 2. **Identify the sources of skills supplied in labour market (i.e., post-secondary programs, migration)**
- **A data-driven approach could identify the skills needed in Alberta as well as the post-secondary programs that supply these skills/workers**

Questions? Comments?
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