The Modern AI-powered TAE: Leveraging AI and Data Science

Leveraging AI and Data Science To Enable and Enhance Personalization, Modularization and Effectiveness of Adult Training and Education

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ABSTRACT

Technological innovation, demographic shifts, evolving business models, and rapid changes to the nature of work are today significantly altering the skills demanded by the labour market. While skills were once enough to last a career, the short and decreasing shelf-life of today's skills places tremendous pressure on the Training and Adult Education (TAE) sector to manage the need for adult re-skilling and skill upgrading. A lack of adequate skills on the market will not only affect job-seekers, but also hold back companies that want to grow, and pose challenges to the economy.

The changing world of work urgently calls for a need for to develop highly personalized, modular, targeted, and most importantly, relevant methods in lifelong learning. In meeting this need, AI and Data Science have the potential to provide the solution to turbo-charge our approach to resolve both immediate challenges and create sustainable practices for the future.

There are however, several barriers to the effectiveness of adult lifelong learning programmes. They include:

> 1) the need to identify what skills are required for the digital economy through timely access to accurate Labour Market Information (LMI);
>
> 2) the need for personalized skills development based on skills-gap analysis that harnesses real-time data extracted from the VUCA world of work;
>
> 3) finally, to deliver timely, modular and targeted training of skills that fulfils both the personalized needs of the learner, as well as, skills demanded by the marketplace.

Given the right push, AI and Data Science have the potential to capably confront these barriers. Using millions of data points from diverse qualified sources, AI can carry out occupational skills mapping to identify skills required for different job titles that accurately reflect the dynamic nature of labour markets in the new digital economy. By making LMI readily accessible and accurate, AI opens up boundless possibilities and potential for the modern TAE.

Breaking the limits of conventional psychometric assessments, a data-driven approach using AI can help users to profile and distill their past work experiences and education background into skills. The result is a skills portfolio as unique as one's fingerprints. The skills portfolio forms the critical foundational piece to compute personalized learning development plans based on the users' interests and skill gaps. Equipped with real time LMI, the modern TAE is now capable of designing and delivering personalized training that is attuned to the changing pulse of the marketplace.

In this paper, it discusses the application of AI and data science by a Singaporean technology company, JobKred, to revolutionize how adult training is designed and delivered. JobKred promulgates the application of AI and data science to help individuals, business, organizations and governments to navigate the world of work.

SYNOPSIS

The changing world of work urgently calls for a need to develop highly personalized, modular, and most importantly, relevant adult training programmes to support lifelong learning. There are however, several key challenges to realise the desired benefits of adult training such as: difficulty in identifying skills required for the digital economy due to systemic time lag in obtaining accurate Labour Market Information (LMI); lack of personalization in the learner's skill development; and finally, the ever-increasing difficulty to design and develop training curriculum that is modular, timely, and up to date with marketplace demands. Given the right push, AI and Data Science have the potential to provide the solution to turbo-charge an innovative approach to resolve both immediate challenges and create sustainable practices for the future. This paper showcases the innovation of using AI to power efficient interplay and collaboration among the workforce, training providers and companies. Case studies on actual implementations will be presented as well.

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Aims

1. This paper provides an exploration and discussion for the application of Artificial Intelligence (AI) and Data Science in the Adult Training and Education (TAE) sector. Broadly, the paper outlines several barriers currently constricting the effectiveness of initiatives and programmes in the TAE sector as well as its impact on various stakeholders within the organization. The result is a gradual increased pressure on the sector to innovate upon old ways to effectively upskill talents for the coming Fourth Industrial Revolution.

2. This paper lends its weight on the disposition towards innovative new practices for the modern TAE sector and posits the viability of using AI and Data Science to overcome difficulties faced in the sector. Specifically, this paper will introduce: first, the use of AI and Data Science in carrying out occupational skills mapping that provides skills profiling tools for individuals and organizations; second, the use of Big Data analytics in competitive benchmarking for organizations; and finally, the personalization and delivery of modular, targeted skills-based training to meet individual and organizational goals. If properly driven, AI and Data Science have the potential to resolve both immediate challenges and create sustainable practices for the future.

3. The processes leveraging AI and Data Science are increasingly being sought after and adopted by training companies, consultancy firms and established corporations across the world. This paper will highlight a potential model in introducing these processes, key benefits, as well as potential issues and recommendations through a case study of JobKred's implementation in a ICT company of over 1,000 staff.

4. This paper will also put forth the metaphorical notion of an organization's Skills DNA. Analogous to the idea of elements making up a person's DNA, an organization's Skills DNA is essentially the skills available within its talent pool (i.e. skill type and proficiency levels). Throughout the rest of the discursion, the paper shall highlight the importance and practical implementations in identifying, designing and operationalizing the Skills DNA of an organization. In today's rapidly changing skills-based economy, the modern TAE needs to acquaint himself with the language of skills and play the role of helping companies to transform their Skills DNA for the future.

Background

Current Practices and Challenges Faced by The Modern TAE

5. Technological innovation, demographic shifts, evolving business models, and rapid changes to the nature of work are today significantly altering the skills demanded by the labour market. While skills were once enough to last a career, the short and decreasing shelf-life of today's skills places tremendous pressure on the TAE sector to manage the need for adult re-skilling and skills upgrading. A lack of adequate skills on the market affects not only job-seekers, but also hold back companies that want to grow. Yet, current practices face various challenges in meeting such needs in the market.

6. One of such challenges is the lack of timely and accurate access to Labour Market Information (LMI). While American organizations spent an average of $1,252 per employee on training and development

initiatives in 2015, totaling more than $350 billion for the year[1], 92% of executives agree that there is a skills gap in the U.S. workforce[2]. This alludes to the point that despite the multitude of training programmes, such programmes are not able to address the needs of the labour market. According to research, 49% of employers seek to identify the gaps between their talent pool's existing skill inventory and what is needed for the future[3]. This business critical mission to overcome the skills gaps demands for real-time access to LMI that current processes cannot provide. The impact on various stakeholders at every level across the organization are as such:

a. <u>Business Owners and Senior Management.</u> Conventionally till date, companies and management often hire external consultants to help them design competencies frameworks to help build towards the company's desired goals. However, such frameworks by themselves, is only effective for a very limited period of time and quickly becomes obsolete as the company and environment change over time. What is needed, is a truly dynamic framework that business leaders can depend on to keep the company abreast with shifts in the labour market, and agile enough to adapt to internal changes within the organization. TAEs need to be able to integrate LMI in their developmental work to give their instruments and interventions that critical dimensions of dynamism and relevancy to marketplace.

b. <u>Human Resource (HR).</u> One of the critical functions of human resource is Learning & Development (L&D). L&D practitioners often reply on consultation with external parties like training providers and HR consultants to help determine the training prescription for their talent pool. However today, it is crucial to empower HR with access to LMI, so that they are equipped with data and insights to play a strategic non-passive role. They would then be in a position to effectively co-create people developmental plans with their training partners and consultants.

c. <u>Staff.</u> Between year 2002 and 2016, jobs in US that require low level skills dropped from 56% to 30%[4]. However, the reality for most employed individuals is a lack of self-directed learning behaviour and motivation for lifelong learning. Many employees often feel that they are 'going through the motion' when it comes to attending company sponsored training. This is because most of such training are often prescribed in a top-down manner without considering the unique needs of individual employees. It is imperative to empower staff with timely LMI to change their mindset and facilitate their lifelong learning journey. WIth the insights from LMI, staff will be able to benchmark and find out their relative competitiveness and employability in the marketplace. In addition, LMI will also facilitate skill gap analysis to help staff take active ownership of their personal skill development and renewal.

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[1] Creative, Vox. "Are You and Your Workforce Ready for the Future?" Recode. November 28, 2017. Accessed October 04, 2018. https://www.recode.net/ad/16710572/workforce-digital-reskill-talent.

[2] 2017 Workplace Learning Report. Accessed October 04, 2018. https://learning.linkedin.com/content/dam/me/learning/en-us/pdfs/lil-workplace-learning-report.pdf.

[3] "Mind the Skills Gap. How the American Workforce Must Evolve to Lead the Global Economy of the Future." 2014. Accessed October 05, 2018. http://pages.adeccousa.com/rs/adeccousa/images/2014-mind-the-skills-gap.pdf. 2.

[4] Muro, Mark, Sifan Liu, Jacob Whiton, and Siddharth Kulkarni. "Digitalization and the American Workforce." Brookings. May 09, 2018. Accessed October 05, 2018. https://www.brookings.edu/research/digitalization-and-the-american-workforce/.

7. The second challenge is the <u>lack of visibility into an organization's skills inventory and profile</u>. With 35% of desired core skills set of most occupations to change between 2015 and 2020[5], 39% of large-company executives saying they were either "barely able" or "unable" to find the talent their firms required[6]. This perennial problem is exacerbated by the hastened declining average shelf-life of skills[7]. Organizations are thus pressured to reexamine how they hire externally and train internally. Yet, with current practices, organizations often find themselves saddled by the limitations of existing conventional methods and research tools. The impact spreads across various actors within the organisation:

   a. <u>Business Owners and Senior Management.</u> Commonly, business leaders are unable to satisfactorily affirm the value of investments made on L&D. According to research, only 8% and 4% of CEOs see the business impact and return on investment of L&D respectively[8]. A key obstacle lies in the fact that leaders have no visibility into the skills inventory available in their organizations at every point in time. Leaders are not able to see clearly how investments made on L&D will translate tangibly to growth in the skill pool within the organization. It is here that TAEs can make use of technology to help business leaders have greater confidence in L&D and hence provide more resources and support for it.

   b. <u>Line Managers.</u> Mid-management personnel also need to have constant access to the skillset of their staff. Firstly, it would enable line managers to be effective in performance coaching and better partner their staff in co-developing individual development plans. Secondly, line managers need to know the skillset available in their teams in order to determine whether they have the capability to realistically achieve the KPIs they are made accountable for. However, this is not the case at present. Line managers often find themselves in an unenviable sandwiched position. From the top, they have to inherit complex competency frameworks, which they need to align and cascade down to their downlines. From the ground, they need to solicit cooperation and compliance from their staff. Most often than not, line managers find themselves caught up in tedious administration, resulting in limited benefits incongruent to their efforts.

   c. <u>Human Resource (HR).</u> There is a whole gamut of HR technologies to help avail HR personnel from manual and tedious tasks, so that they can have more time for strategic tasks. However, the fact remains that HR are not empowered enough with actual data insights for them to be able to advise in C-suite meetings how advancement of business goals can be directed linked to human capital development initiatives. Through technology, TAEs can help HRs to identify the Skills DNA of their company, at present and the future. This information will open up many exciting possibilities to perform strategic human resource developmental work previously impossible. TAEs should seize the opportunity to partner HRs to consult and co-create with them a Skills DNA for their companies that is future-ready.

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[5] "Skills Stability." The Future of Jobs. Accessed October 05, 2018. http://reports.weforum.org/future-of-jobs-2016/skills-stability/.

[6] "Deloitte's 2013 Global Finance Talent Survey." Accessed October 05, 2018. https://deloitte.wsj.com/cfo/files/2013/07/Deloitte-global-finance-talent-survey-report-2013.pdf.

[7] "Skills Stability." The Future of Jobs. Accessed October 05, 2018. http://reports.weforum.org/future-of-jobs-2016/skills-stability/.

[8] 2017 Workplace Learning Report. Accessed October 05, 2018. https://learning.linkedin.com/content/dam/me/learning/en-us/pdfs/lil-workplace-learning-report.pdf. 12.

d. <u>Staff.</u> Ultimately, the success of most L&D interventions depend upon the motivation and sustained self-directed behaviour of staff to learn. Staff need to be able to see clearly what is in it for them, how the skill gaps and resultant learning interventions benefit them in terms of career progression or growth. They need to have visibility and control over their own (individual) Skills DNA, knowing where they are, how far they are from company standards, and how to bridge those gaps. It is critical to empower staff with tools to support them in their lifelong learning journey, as they continuously learn, apply and earn skills, building up their skills portfolio over time.

8. The last challenge is <u>delivering personalised, modular, targeted skills-based training to staff to advance both the individual's career goals and the organisation's business goals</u>. Currently, training needs analysis is often prescribed for the entire department, or relies on external training providers to recommend training programmes. Such recommendations from training providers typically are not personalized to the needs of individual employees in the company. It may also be biased towards the courses that the provider has available. Another common phenomenon is for L&D managers to procure a repository of learning resources as large as possible for their employees to choose from. Despite the best intentions, such an approach is often reciprocated by underwhelmingly low engagement results to utilize these learning resources. The effects on the various stakeholders in the organization are as such:

a. <u>Business Owners and Senior Management.</u> According to Deloitte's Global Human Capital Trends 2015 Survey, many executives believe their organizations are doing a "fair/poor" job of leadership development and managing/delivering effective training programmes[9]. This points to the misalignment between the perceptions of management and the ability of L&D to deliver effective training programmes. The modern TAE needs to revamp the way training programmes and calendars are recommended to their corporate clients. A bottoms-up and personalized approach is warranted to surgically solve the needs of the organization that they consult for. Not only will it help organizations to save tremendous training dollars, it would also enable decision-makers to tangibly see for themselves the ROI of people development.

b. <u>Human Resource (HR).</u> L&D personnel takes on the important role to purvey and procure training programmes for their colleagues. The current dilemma that L&D face can be described with an analogy of heading straight to the pharmacy to pick up medicine without obtaining a proper prescription first. This prescription that we speak of is a proper data-driven skill gap analysis that identifies and aggregates the unique skill gaps of the entire population of staff. This approach is in sharp contrast to most existing approaches of relying on qualitative feedback from internal ranks and expert opinion from external parties. As a result, many L&D programs do not fully deliver its promised impact and suffer from high inefficiencies.

c. <u>Staff.</u> When staff are herded to attend company-sponsored training programmes, which are developed using a top-down and impersonalized approach, the obvious outcome would be poor engagement levels and lack-lustre learning experiences with limited impact in people development. When staff do not see the point, and attend courses out of duty as a good corporate citizen, the wastage incurred by both the individual and the company is substantial and unnecessary.

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[9] "Corporate Learning. How Current Trends Are Accelerating the Demand for Transformation." Accessed October 05, 2018. https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/human-capital/lu-corporate-learning-trends-accelerating-demand-transformation-16062016.pdf.

9. Lessons from these challenges demonstrate the opportunity for the modern TAE to harness innovative tools and insights, made possible by AI, to completely elevate their consulting work to the next quantum level. The modern TAE can help companies to build a dynamic skills framework that will enable companies to stay agile and constantly be able to adapt to changes in the external environment and within the organization. TAEs need to evolve from building traditional competency frameworks that are non-dynamic and exists as a snapshot, only relevant at the point it was published.

Innovations Using AI And Data Science

10. Given the right push, AI and Data Science have the potential to capably confront these barriers. By overcoming human limitations to compute millions of data points and through the introduction of smart infrastructure, AI opens up boundless possibilities and potential for the modern TAE.

11. Real-time, Data-Driven LMI. AI can carry out occupational skills mapping to identify skills required for different job titles. The result is a taxonomy that accurately reflects the dynamic nature of labour markets in the new digital economy. TAEs can integrate such information into their practices and recommendations. A key benefit of such an approach lies in the ability for such information to stay up-to-date and relevant all the time, made possible by continual machine learning of data amassed from diverse qualified online and offline data sources. TAEs can use the data insights to perform robust data-driven competitive benchmarking for the organizations which they consult for. Skill gap analysis can then be performed to help organizations carry out effective on-point strategic human resource development work.

12. Skills Profiling and Skills-Gap Analysis.

   a. Individual/Staff. AI and Data Science can also be used by TAEs to profile individuals and distill their past work experiences and education background into skills that go beyond conventional psychometric assessments. The result is a skills portfolio as unique as one's fingerprints. The skills portfolio forms the critical foundational piece to derive personalized learning development plans based on the individual's' career aspirations and skill gaps.

   b. Organization. On an organizational level, skills profiling can be applied organization wide to identify the skills portfolio for every employee. This information aggregated as a whole, will give organizations insights to their Skills DNA. Facilitated with technology, updating this information at real-time, this empowers management and HR in maintaining a constant pulse of the skills profile and movement of their organization.

13. Personalized Course Recommendations And Surgical Training Implementation. There is also an opportunity for courses that TAEs provide, be mapped to the skills taxonomy adopted by their enterprise clients. This allows courses to be automatically recommended to individuals based on their individual skill gaps. On an organisational level, this also allows for training programmes to be surgically implemented, by personalizing training for every employee whilst minimising inefficiency and time loss in sending staff to generic or unnecessary training programmes.

14. Smart Systems For Senior Management And Line Managers. Through technology, senior management can monitor at real time the Skills DNA of their organization, benchmark against real-time LMI, set goals and monitor performance of the organization. This technologized approach, in contrast to

current practices, allows for greater clarity and co-creation across ranks. In addition, the creation of such systems also has a long term advantage of being sustainable. Currently, companies need to commission costly consultancy projects from time to time to refresh their competency frameworks. With smart and dynamic systems, such practices shall be made obsolete resulting in tremendous cost savings. Even with employees joining or leaving the company, the system will be able to update and adapt accordingly and provide senior management and line managers with accurate data insights, at every point in time, for them to effectively lead the company towards its planned future.

15. <u>Measurement of ROI.</u> As a process, this could also offer a potential model for management to capture "the ROI of Learning". Currently, attendance sheet and training satisfaction score are commonly used by most practitioners to measure the value and effectiveness of training. These training fail to measure the actual gains in skills and performance at the workplace in the organization's context.
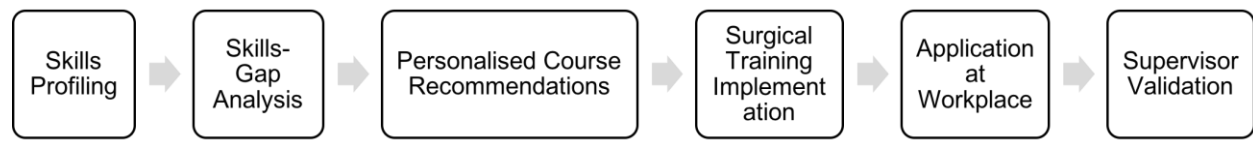
Upending this age-old limitation of measuring training ROI, the above diagram illustrates the entire process of measuring applied training. Beginning with skills profiling followed by skill gap analysis, measurements should span across the entire gestation period from training to application of that skill in the workplace. Ending with the validation of the skill gain by the employee's supervisor or an independent assessor, what gets captured is true applied learning and shall accurately inform the ROI of learning interventions and programmes.

16. Through AI-powered LMI access and big data analytics, the modern TAE is now capable of designing and delivering personalized training that is attuned to the changing pulse of the marketplace.

Case Study

17. The company described in this case study is an international Information Technology company, with employees around the globe. Applying JobKred's AI and cloud-based solution, the company is empowered to embark on a sustained journey to keep a pulse on the Skills DNA of its organization.

    a.   Organization-wide skills profiling and validation using JobKred's AI to map out the company's present Organization Skills DNA.

    b.   Using JobKred's Big Data analytics and Singapore SkillsFramework, the company performs global and local benchmarking to chart their company's human capital transformation plan.

    c.   Over 4 weeks, the company gained access to a living and dynamic system that enables a real-time constant monitor of the company's skills profile and movement, even with staff joining or leaving the company.

    d.   Launched a self-service digital career guidance platform for all staff spread across all the countries that the company operate in. The platform powers individual skill gap analysis, personalized course recommendations and skill-based mentorship.

e. Management was able to encourage and facilitate lifelong learning in employees through the valuable data and insights used to effectively partner their talents in their professional development.

f. RESULTS: The company was empowered to become data-driven, skill-oriented and highly strategic in the way they hire and develop their talents, as they transform their Organisation Skills DNA for their desired future in the new digital economy.

18. With the implementation, it offered a number of immediate solutions to the difficulties faced by the modern TAE sector.

a. Higher Value. With access to global data, more value beyond solely expert opinion was offered to clients that also at the same time, represented more accuracy, representation and less tedious, manual fieldwork. The time and money freed up can then be better spent on higher value consulting work.

b. Demonstrate Higher ROI on L&D. With skill-gaps analysis performed upon goals set by the organization through competitive benchmarking offered by the platform, more precise and personalized recommendations can then be made to the employees based on their skill gaps. Rather than procuring excessively a whole amazon of courses, tailored learning content can now be systematically developed to better help the organization skill its talent pool. A more data-driven and tangible business case is also formed to demonstrate the ROI and effectiveness of L&D and Talent Management to management.

c. Better Quality Training. Employees across all ranks enjoy recommendations to learning and training resources according to their unique skill gaps and career goals. As a result, staff feel more motivated and engaged when they attend training programmes. They also start to take more ownership of their own personal development and progressively become more self-directed and self-motivated to upskill themselves.

19. In the long term, the implementation also offers an engaging and meaningful long term partnership between the client and the TAE sector. After the initial set-up phase, what remains is the constant engagement through the platform where TAE practitioners can effectively partner with their clients, to keep a constant pulse on the evolving needs of the organization. TAEs are empowered to continually adapt their training methods and curriculum to meet the changing needs of the organization. Essentially, TAEs will truly be able to forge strategic long-term partnership with their clients in identifying, developing and future-readying the Skills DNA of the organization.

Conclusion

20. With modern day pressures - technological innovation, changing demographics, shifting business models - to the nature of work, the way we approach TAE needs to adapt as well to properly address the changing demands. AI and Data Science offers a means of turbo-charging our practices that will not only overcome the modern challenges TAEs face, but also significantly elevate its strategic role and value to their clients to the next quantum level.

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