ENHANCING GRADUATE EMPLOYABILITY BY BRIDGING SKAOs GAPS THROUGH JOB-BASED CURRICULUM DEVELOPMENT

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Abstract*: This research project aims to develop a job-based curriculum framework that aligns graduates' skills, knowledge, abilities, and other attributes (SKAOs) with industry requirements, in enhancing graduates' employability. The study will analyze 3,000 job advertisements sourced from platforms such as MyFutureJobs (under the Ministry of Human Resources) and JobStreet Malaysia to identify the specific job tasks, skills, and competencies required by employers. By examining the job descriptions (JD) and job specifications (JS), the research will determine the core SKAOs expected by industries to ensure higher education curricula are up-to-date and relevant to the labor market. To validate the findings, endorsement sessions with selected employers and personnel from the Ministry of Human Resources will be conducted to validate the SKAOs (Job Description and Job Specification with Assigned Level/Ranking, Degree of Importance, and Corresponding Weightage) in addressing the gaps to formulate the relevant Training & Development Programs. This approach seeks to close the gap between academic training and industry demands, ensuring graduates are equipped with the skills necessary for immediate entry into the workforce. The project also targets jobless alumni and final-semester students through tailored training and development programs managed by UiTM Pulau Pinang Branch, in coordination with other relevant programs provided by the Ministry of Human Resources. These programs aim to address the gaps in graduates' SKAOs, ensuring they are prepared to meet industry expectations. In doing so, the higher education institutions (HEIs) will continuously adapt their curricula to reflect evolving labor market needs, providing graduates with the competencies required to thrive in their professions.*

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Introduction

A discipline-specific curriculum design that effectively integrates learning contexts and assessments, while addressing a 'constructive, explicit, and reflective' teaching approach, is essential for enhancing students' employability skills. To improve employability outcomes, higher education institutions (HEIs) must refine teaching and learning practices to align closely with the demands of various disciplines. Findings from a five-year research study conducted in Australia, utilizing a reflective practice methodology, offer valuable insights into the role of constructive alignment in assessments for learning, particularly about graduates' marketability within the field of building and construction management (Ruge & McCormack, 2017). The study highlights that employability skills are cultivated through curricula that are thoughtfully aligned with industry expectations, allowing students to bridge academic knowledge with professional learning dimensions (metacognition), while gradually building the necessary competencies for their careers. Furthermore, a 'constructive, explicit, and reflective' teaching method has been shown to enhance student engagement, facilitating the development of both general and professional skills. Ultimately, a well-designed curriculum that integrates industry requirements is crucial to achieving high rates of graduate employability.

The advent of the Fourth Industrial Revolution (IR4.0) marks a pivotal moment in history, characterized by rapid technological advancements that are reshaping industries, economies, and societies on a global scale. At the heart of this revolution lies a fundamental shift in how work is approached, with task-based roles being replaced by human-centered values that prioritize creativity, critical thinking, collaboration, and innovation. This shift presents both challenges and opportunities for Higher Education Institutions (HEIs) as they strive to prepare graduates for the evolving demands of the job market. Traditional recruitment and selection practices, often based on outdated models, are proving inadequate in meeting the needs of IR4.0-driven industries, where adaptability and advanced skills are paramount. To address this issue, the integration of job analysis with recruitment and selection practices becomes crucial (Singaram et al., 2023).

In this context, the Malaysian Higher Education Ministry has recognized the necessity of aligning HEIs with the demands of IR4.0, as seen in its 2015-2025 strategic plan. This plan emphasizes the development of curricula that equip students with critical skills such as digital literacy, creativity, and leadership. However, there remains a gap in understanding the specific educational competencies required for success in IR4.0, highlighting the need for ongoing research and innovation in educational practices. By focusing on person-task fit through the integration of job analysis and recruitment, organizations can optimize the efficiency of their hiring processes and ensure that graduates are adequately prepared to thrive in the rapidly changing job market. Ultimately, this integrated approach to human resource practices will play a crucial role in shaping a future-ready workforce capable of meeting the challenges and opportunities presented by the Fourth Industrial Revolution.

Another supporting study conducted by (Saquin, 2023) explored the relevance of the curriculum to graduates' careers by analyzing the relationship between graduates' socio-demographic characteristics, current job positions, the industries in which they are employed, and their employment terms and conditions. The study also investigated the challenges graduates faced

in securing employment and gathered their feedback on how well the skills acquired from their respective programs aligned with their current careers. The findings revealed that the skills provided by their academic programs were generally of moderate relevance to their professional roles.

The rapid advancement of 21st-century technologies, such as artificial intelligence, robotics, automation, nanomaterials, and additive manufacturing, is reshaping business processes through digital platforms and networks. As the future work landscape evolves rapidly, it becomes essential to design education systems that offer a flexible array of disciplines and degrees, enabling learners and graduates to navigate and succeed in a VUCA (volatility, uncertainty, complexity, ambiguity) environment. Teaching 21st-century skills, which are inherently metacognitive and fractal, is crucial, as they apply fundamental principles across various levels of detail and knowledge (Reaves, 2019).

Literature Review

In today's rapidly changing labour market, the responsibility of higher education institutions (HEIs) to prepare students for employment has become more critical than ever. A well-structured curriculum is fundamental in equipping students with the essential skills, knowledge, and competencies needed to excel in their respective careers (Mahmud & Wong, 2022). To remain effective, curricula must undergo regular review, revision, and updating to align with current industry standards and the shifting demands of the job market. According to Virgolesi et al. (2020), a key factor in maintaining curriculum relevance is the active involvement of stakeholders—especially employers—in the development process. Employers offer valuable insights into the specific qualities, knowledge, and abilities they look for in candidates, which are crucial for filling roles effectively. By involving these stakeholders, HEIs can gather critical feedback that informs curriculum design, ensuring it is aligned with the practical needs of the labour market and better-preparing graduates for successful careers.

The significance of job descriptions in aligning job applicants with suitable roles within organizations is well recognized. A study conducted by (Quan, 2023) analyzed 160 job descriptions specific to the translation profession, published in Shanghai. Job descriptions (JDs) typically outline the required educational background, experience, and necessary skills for potential candidates. In this study, researchers employed corpus data to examine the linguistic features of translation job descriptions and assess the corresponding market demand for the profession. The findings revealed that graduates equipped solely with language translation abilities face challenges in entering the language service industry. Additionally, a notable gap exists between the current supply of translation graduates and the demands of the job market. Employers emphasized that graduates must not only possess strong language skills but also demonstrate robust industry knowledge and multidimensional competencies. This study offers valuable insights for higher education institutions (HEIs) offering translation majors, recommending the development of curricula that align with industry needs. By doing so, HEIs can better prepare graduates to meet job market demands while fostering their professional growth and enhancing their employability.

In today's highly competitive labor market, graduates must maximize their potential to distinguish themselves from other equally qualified and skilled candidates. A study conducted by (Micabalo et al., 2021) aimed to assess the impact of curriculum on graduates' employability. The study utilized a snowball sampling strategy, with 169 respondents participating. The findings indicated that communication skills, basic accounting skills, and financial reporting

skills are essential for securing employment in the labor market. Moreover, the study concluded that enhancing graduates' employability requires a reliable and practical curriculum, effective teaching methodologies, and access to necessary resources and facilities. Additionally, the research emphasized that fostering strong partnerships through internship programs can enhance the alignment between educators, students, and industry employers, thereby further improving graduates' preparedness for the job market.

Thus, Higher education institutions (HEIs) must systematically determine the skills, knowledge, abilities, and other attributes (SKAOs) that are essential for success in various professions and industries based on the employer's preferences. This determination is typically accomplished through a process known as job analysis (JA), which involves the detailed examination of job descriptions (JD), and job specifications (JS) specified by the employers or industries in the labor market via the job postings. Job analysis outcomes, namely JD and JS provide a robust framework for identifying the competencies required in specific roles, which can then be integrated into the curriculum. To enhance graduates' marketability, the curriculum should incorporate the employability skills, knowledge, abilities, and other attributes or competencies identified through job analysis. These elements must be strategically embedded in the curriculum to ensure that students acquire not only the technical expertise required for their field but also the soft skills and professional attributes that are highly valued by employers. A curriculum designed with employability in mind helps bridge the gap between academic learning and practical application, thereby increasing the likelihood of successful employment outcomes for graduates. Reeves, R., & Hahn, T. (2010) conducted a quantitative analysis of current job advertisements and job descriptions relevant to recent MLS or MLIS graduates. The objective of the study was to gather data in support of a comprehensive review of the MLS program at the College of Information Studies (iSchool), University of Maryland. This review aims to ensure that the MLS curriculum offers both the theoretical and practical education necessary to prepare graduates for careers in the information professions. Utilizing traditional content analysis methods, the study examined over 1,000 job advertisements targeting new graduates. The analysis revealed that employers highly value personal attributes such as communication skills, service orientation, collaboration, cooperation, and teamwork abilities. Additionally, many entry-level positions require some level of prior experience. The findings from this study are intended to inform faculty in advising students and revising curriculum design, while also providing valuable insights for new graduates entering the job market.

The continuous development and refinement of educational curricula are crucial to maintaining their relevance in an ever-changing job market. By actively engaging employers and other stakeholders in the curriculum development process, HEIs can ensure that their programs produce graduates who are well-prepared to meet the demands of their professions. Through the systematic identification and integration of essential SKAOs, derived from rigorous job analysis, HEIs can design curricula that not only meet industry standards but also enhance the employability and marketability of their graduates.

The Job Analysis

Job analysis, which involves systematically studying job roles to identify tasks, responsibilities, and required competencies, provides a clear foundation for aligning recruitment processes with industry demands. This integrated approach ensures a strong person-task fit, meaning that the skills and attributes of candidates are closely aligned with the specific requirements of the roles they are selected for. As industries increasingly emphasize innovation and digital literacy, the importance of ensuring person-task fit becomes even more pronounced. Graduates entering the

workforce must not only possess technical skills but also demonstrate the ability to adapt to new technologies, collaborate in diverse teams, and think critically about complex problems. Job analysis provides essential insights that help HR professionals assess these competencies and, in turn, inform more effective recruitment and selection strategies. Furthermore, incorporating job analysis into recruitment practices helps avoid poor hiring decisions, reduces turnover, and enhances organizational efficiency by ensuring that the selected candidates are equipped to meet the challenges of their roles (Barrick & Parks-Leduc, 2019).

In today's rapidly evolving labor market, the responsibility of higher education institutions (HEIs) to prepare students for successful careers has never been more critical. A robust curriculum is fundamental in providing students with the skills, knowledge, and abilities necessary for their professional journeys. To ensure that the curriculum remains relevant and effective, it must be regularly reviewed, revised, and updated in alignment with current industry standards and the changing demands of the job market.

A key element in maintaining curriculum relevance is the active engagement of stakeholders, especially employers, in the curriculum development process. Employers bring valuable insights into the competencies and qualities they seek in candidates, including specific skills, knowledge, and abilities crucial for effectively filling job positions. By involving these stakeholders, HEIs can collect feedback that helps tailor the curriculum to meet the practical needs of the labor market, ensuring graduates are well-equipped for employment.

HEIs must systematically identify the essential skills, knowledge, abilities, and other attributes (SKAOs) required across various industries. This process is typically carried out through job analysis (JA), which involves a detailed examination of job descriptions (JD) and job specifications (JS) (Brannick et al., 2019; Qin et al., 2022; Rudolph et al., 2017). Job analysis provides a comprehensive framework for understanding the competencies necessary for specific roles, allowing HEIs to integrate these requirements into their curricula.

To increase graduates' marketability, the curriculum should incorporate the employability skills, knowledge, abilities, and competencies identified through job analysis. These elements should be strategically embedded in the curriculum to ensure that students not only gain technical expertise but also develop the soft skills and professional attributes that employers highly value. A curriculum designed with employability in mind effectively bridges the gap between academic learning and practical application, enhancing graduates' chances of securing employment.

The ongoing development and refinement of educational curricula are essential to maintaining their relevance in a constantly changing job market. By actively involving employers and other stakeholders in the curriculum development process, HEIs can ensure that their programs prepare graduates to meet the demands of their professions. Furthermore, Masengu et al. (2023) stated the systematic identification and integration of critical SKAOs, derived from rigorous job analysis, HEIs can design curricula that meet industry standards while enhancing the employability and marketability of their graduates.

The schematic diagram, titled "Overview of Job Analysis Process and Outcomes," by (Catano, Wiesner, Hackett & Methot, 2010) shows the integration of job analysis with other HR functions, particularly recruitment and selection, is crucial for ensuring that graduates are recruited and selected based on the "person-task fit." This approach not only enhances the

efficiency of the recruitment process but also ensures that the selected candidates are well-suited for the roles they are hired for (Figure 1).
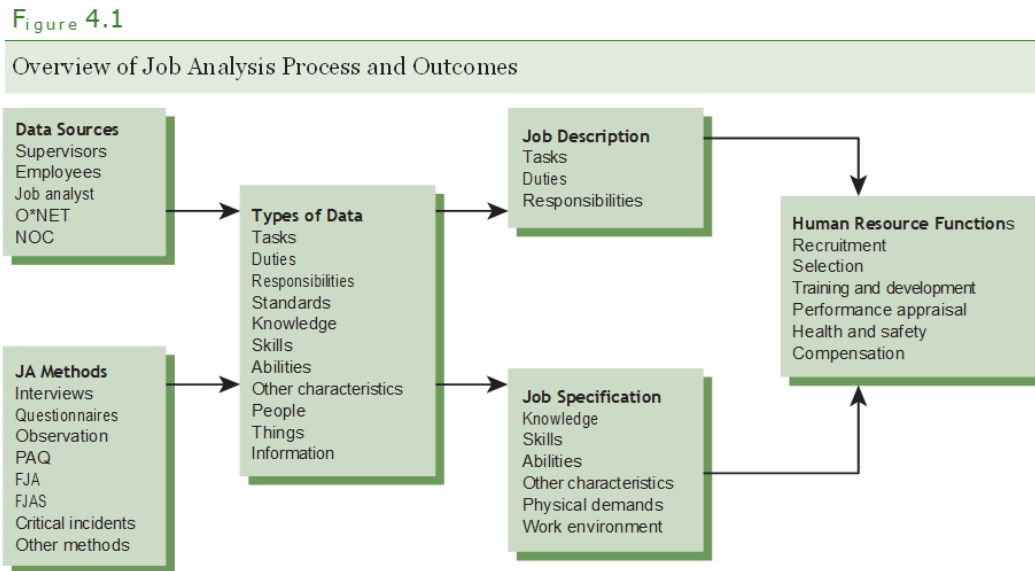

Figure 1:
Source: CATANO VM, WIESNER WH, HACKETT RD, METHOT LL (2020)

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What Are SKAOs?

Skills, Knowledge, Abilities, and Other Attributes (SKAOs) are the foundational components that define an individual's readiness and effectiveness in performing a specific job. Skills refer to the specific competencies or expertise that an individual develops through training, practice, or experience (Vaci et al., 2019). These are often task-specific and can range from technical skills, like software proficiency or equipment handling, to soft skills, such as communication, teamwork, or problem-solving. Skills are crucial because they directly influence how well a person can execute the tasks required by a job.

Knowledge represents the information, concepts, and understanding that an individual must possess to perform a job effectively. In addition, Campbell-Barr (2018) interpreted the knowledge is usually acquired through education, training, and experience. It includes the principles, facts, and theories relevant to a particular field, such as industry regulations, company procedures, or technical specifications. Having the right knowledge base allows individuals to make informed decisions and apply their skills effectively in their roles.

Abilities are the inherent capabilities or potential that enable individuals to perform tasks successfully. Unlike skills, as elaborated by Ellis et al. (2022), abilities are acquired over time, abilities are more innate. They include cognitive abilities, such as analytical thinking and problem-solving, physical abilities like strength and coordination, and interpersonal abilities that facilitate communication and teamwork. Abilities are essential because they underpin how

quickly and effectively an individual can learn new skills and adapt to changing job requirements.

Other Attributes encompass a range of additional characteristics that contribute to job performance but do not fall strictly under skills, knowledge, or abilities. Harzer et al. (2021) argued that personality traits, such as resilience, adaptability, and motivation, as well as work styles and values, like attention to detail, dependability, and a commitment to continuous learning. These attributes often determine how well an individual fits within a specific organizational culture and how they approach their work.

Together, SKAOs provide a comprehensive framework for evaluating the qualifications and potential of candidates for various roles. They guide the development of job descriptions, inform recruitment and selection processes, and shape the design of educational programs that prepare individuals for the demands of the workforce. By understanding and targeting the right SKAOs, organizations can ensure they are attracting and developing talent that meets their needs both now and in the future.

Problem Statement

Despite Malaysia's low unemployment rate, the labor market is currently exhibiting signs of mismatch, indicating a misalignment between labor demand and supply across various dimensions, including education, skills, geography, occupation, and industry. Failure to accurately identify these mismatches could exacerbate unemployment issues. This study aims to calculate the labor mismatch index and assess the contribution of mismatch unemployment to the rising unemployment rate, using the matching function as a framework. Data from the Department of Statistics Malaysia, the Ministry of Human Resources Malaysia, and Bank Negara Malaysia are examined. The findings reveal that the skills mismatch index in the Malaysian labor market has gradually increased from 0.108 in 2007 to 0.273 in 2017, contributing to the rising unemployment rate and signalling a significant mismatch in the labor market (Chen et al., 2020).

Malaysian graduates are facing increasing challenges in securing jobs within the employment market. The rising unemployment rate has the potential to negatively impact the reputation of Malaysia's educational system and erode employers' confidence in the capabilities of local graduates. Although Malaysian universities produce many graduates, only a small percentage secure employment. This issue arises when graduates prioritize academic achievements over the cultivation of essential traits and skills required for the workforce. Additionally, many graduates are selective in seeking high-paying jobs, yet do not meet the necessary job requirements. Addressing the root causes of this issue is critical in understanding the relationship between graduates' attributes, skills, job mismatches, unrealistic salary expectations, and unemployment. A study conducted among alumni of a public university revealed that graduates' attributes are the most significant contributing factor to unemployment (Jeffri & Abdul Rahim, 2023).

In Malaysia, graduates face challenges in securing employment, as they struggle to find job opportunities that align with their skills, while employers find it difficult to identify candidates who align with their business vision. Two primary factors contributing to the rising unemployment rate are graduates' lack of employability skills and job mismatches. A study was conducted to explore the relationship between employability skills and job mismatches in graduate unemployment, focusing on graduates from the Faculty of Business and Management

(FBM) at UiTM. The findings revealed that both independent variables—employability skills and job mismatches—significantly contribute to graduate unemployment (Mohd Salahuddin et al., 2023).

There is a limited study on the exploration of the recent job requirements sought by employers about the tasks that the applicants or job seekers as well as the graduates are expected to perform on the job. Even though the Malaysian Educational Blueprint provides competency sets for Higher Education Institutions based on a certain field of studies or professions, the employer requirements may be different and present more up-to-date skill requirements, and it is useful for curriculum renewal (Broome & Gillen, 2014). Most employers' job competency requirements established for online job postings are more reliable than relying on the competencies described in the literature and from professional bodies (Reeves & Hahn, 2012; Cramer & Tenzek, 2013).

It has been observed that the abilities required to obtain a job appear to be distinct from those required once a job has been obtained (Semeijn, Veldon, Heijke, & Vlueten, 2006; Messum, D., Wilkes, L., & Jackson, K. P. (2016). According to Bennett (2002), job advertising accurately reflects the skills and attributes that employers seek since the job competency requirements specified in the advertisements are carefully studied and assessed to suit the positions once the job analysis is completed. Current industry skill requirements can be found in job adverts, which can help inform curriculum development. Current and future graduates can use it to compare and analyze their competency gaps.

The accelerating evolution of 21st-century technologies, including artificial intelligence, robotics and automation, nanomaterials, and additive manufacturing, will increasingly disrupt multiple industries. These recent transformations in business processes are driven by digital platforms and networks. The future of work will be a constantly changing landscape, with no job or career guaranteed. Structuring education with a flexible menu of predefined disciplines and degrees is crucial to helping learners or graduates survive and thrive in a VUCA (volatility, uncertainty, complexity, ambiguity) environment. Teaching 21st-century skills, which are inherently metacognitive and fractal, is essential as they demonstrate the same basic principles at various levels of detail and knowledge (Reaves, 2019).

A study by Ma'dan et al. (2020) found that Malaysian graduates are facing increasing challenges in securing jobs within the employment market. The rising unemployment rate has the potential to negatively impact the reputation of Malaysia's educational system and erode employers' confidence in the capabilities of local graduates. Although Malaysian universities produce many graduates, only a small percentage secure employment. This issue arises when graduates prioritize academic achievements over the cultivation of essential traits and skills required for the workforce. Additionally, Mohd Abdul Kadir et al. (2020) argued many graduates are selective in seeking high-paying jobs, yet do not meet the necessary job requirements. Addressing the root causes of this issue is critical in understanding the relationship between graduates' attributes, skills, job mismatches, unrealistic salary expectations, and unemployment. A study conducted among alumni of a public university revealed that graduates' attributes are the most significant contributing factor to unemployment. There is a limited study on the exploration of the recent job requirements sought by employers about the tasks that the applicants or job seekers as well as the graduates are expected to perform on the job. Even though the Malaysian Educational Blueprint provides competency sets for Higher Education Institutions based on a certain field of studies or professions, the employer

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Thus, this research's main objective is to address the SKAOs gap by analyzing the JD and JS based on job postings (industry job requirements) and HEIs curriculum and developing the training and development to fill up the gaps.

Impact of IR 4.0 on Education

The Fourth Industrial Revolution (IR4.0) is transforming higher education by emphasizing human-centered qualities over traditional task-based attributes. To thrive in this era, education systems worldwide must adapt by enhancing human resources' ability to master technology. The study conducted by (Kipper et al., 2021) aimed to identify the key competencies required for Industry 4.0. This research involved a comprehensive literature review and scientific mapping of professional qualifications for Industry 4.0 using data from Scopus, Web of Science, and Science Direct databases, analyzed through SciMAT software. The findings highlight a critical set of competencies—both knowledge and skills—that must be cultivated through professional education to meet the demands of the new industrial revolution. The study underscores the importance of coordinated efforts between companies, governments, and universities to establish "learning factories" that effectively prepare professionals for the evolving needs of Industry 4.0.

The primary competencies identified include leadership, strategic knowledge vision, self-organization, the ability to give and receive feedback, proactivity, creativity, problem-solving, interdisciplinarity, teamwork, collaborative work, initiative, communication, innovation, adaptability, flexibility, and self-management. Additionally, the study emphasizes the necessity of proficiency in contemporary fields such as information and communication technology, algorithms, automation, software development and security, data analysis, general systems

theory, and sustainable development theory. These competencies are essential for aligning professional education with the demands of Industry 4.0. The Malaysian Higher Education Ministry, through its 2015-2025 Education Higher Strategic Plan, has emphasized the need for a relevant and sustainable education system. As IR4.0 drives the innovation of new products, processes, and services, HEIs must ensure their curricula prepare students for these changes, thereby enhancing employability and contributing to sustainable development. Addressing the challenges of IR4.0 in education is essential for maintaining the relevance and effectiveness of higher education in the 21st century (Malaysia Education Blueprint, 2015-2025) (TNR, 12, single spacing, justify)

The Application of The Job Analysis

Recent job postings for Human Resource Development (HRD) practitioners reveal a growing demand for expertise in educational technology, particularly in instructional design, training delivery, and learning management systems. This shift underscores the increasing integration of technology into learning and development (L&D) practices. Although the study is limited by its focus on job postings from the Association for Talent Development (ATD) site, it has significant implications for educational programs. By aligning curricula with these technological competencies, educators can better prepare students for the evolving demands of the HRD field (Hirudayaraj & Baker, 2018).

Job analysis is crucial for developing behavioral interviewing protocols and validating pre-employment selection methods, including personality assessments like the Myers-Briggs and Big Five tests. Studies have shown that online job advertisements provide valuable insights into employer expectations and skill requirements. For instance, research by Wise et al. (2011) and Broome and Gillen (2014) highlighted high-demand skills, while other studies examined ideal employee characteristics over time. This data is particularly useful for updating curriculum frameworks to ensure they reflect current industry needs (Lavy & Yadin, 2013; Emery, Crabtree, & Kerr, 2012; Messum, Wilkes, & Jackson, 2016).

Employability skills such as communication, teamwork, and relevant experience are frequently highlighted in job postings, with experience being a critical factor for many positions. The importance of work-based exposure, especially for entry-level roles, has led to calls for higher education institutions to incorporate internships and apprenticeships into their curricula. This approach not only addresses skill gaps identified in job postings but also enhances the marketability of graduates (Orme, 2008; Graduate Careers Australia, 2015).

Analyzing online job advertisements offers a cost-effective and comprehensive method for identifying the skills, knowledge, and attributes required by employers. This data helps higher education institutions align their curricula with the evolving demands of the job market, ensuring that graduates are equipped to meet these needs. By continuously assessing job postings, educators can stay updated on industry trends and make informed decisions to improve their programs (Lavy & Yadin, 2013; Emery, Crabtree, & Kerr, 2012; Messum, Wilkes, & Jackson, 2016).

Applicant attraction is influenced by multiple factors, including job characteristics, recruiter behavior, and perceptions of the recruitment process. Research by Chapman et al. (2005) shows that positive recruiter interactions and a well-organized recruitment process enhance applicant attraction. The perceived fit between the applicant's values and the organization's culture, as well as hiring expectancies, further influences this attraction. However, these factors are

mediated by applicant attitudes and intentions, making the recruitment process a complex and dynamic one that organizations must carefully manage to secure top talent (Chapman et al., 2005).

Job Advertisement/Job Postings

Job advertisements are the platform in which the level of job qualifications is publicly expressed. A study by Mcarthur, E., Kubacki, K., Pang, B., & Alcaraz, C. (2017) analyzed job advertisements to gain insights into the specific skills and attributes employers seek in candidates for graduate marketing roles in Australia. The content analysis examined 359 marketing job advertisements from the leading Australian job website, seek.com.au. This data provided detailed primary information directly from employers, contrasting with the generic variables often emphasized by academia, thus highlighting the gap between academic preparation and industry needs. The study found that the most sought-after attributes include motivation, time management, communication skills, and digital marketing experience. These findings raise important questions regarding the objectives of a marketing degree and whether current marketing curricula adequately align with industry job requirements. The research also delves into the prerequisites for graduates in Australia to be considered "work-ready.

Another supporting empirical study examined the 21st-century learning skills essential for workplace success by analyzing employers' job advertisements. A descriptive analysis of 142,000 job postings was conducted to rank skill demand across various industries. The findings highlighted that oral and written communication, collaboration, and problem-solving skills are highly sought after by employers. Although numerous 21st-century skills are emphasized in the literature as critical for workplace success, their relevance varies depending on job characteristics. The study also uncovered differences in the education levels and degree fields required by employers. A follow-up sample of approximately 120,000 job advertisements was collected over a year, reinforcing the initial findings. These results have significant implications for shaping educational standards focused on developing 21st-century (Rios et al., 2020). Virgolesi, M., Marchetti, A., Pucciarelli, G., Biagioli, V., Pulimeno, A. M. L., Piredda, M., & De Marinis, M. G. (2020) claimed that graduates who possess strong language abilities, solid industry knowledge, and multidimensional competencies. The study aims to guide universities offering translation majors in developing curricula that align with industry needs, thereby enhancing graduates' professional growth and improving their employment prospects. This research examines 160 job descriptions specific to the translation profession, focusing on educational backgrounds, experience requirements, and knowledge skills. By employing a corpus data method, the study analyzes the linguistic characteristics of translation job descriptions and assesses the job market demand for translation graduates. The findings reveal a significant disparity between the current supply of translation graduates and the job market demand, with employers seeking candidates who possess strong language abilities, solid industry knowledge, and multidimensional competencies. The study aims to guide universities offering translation majors in developing curricula that align with industry needs, thereby enhancing graduates' professional growth and improving their employment prospects (Quan, 2023). The recruitment process highly relies on the job analysis outputs; Job Description (JD) and Job Specification (JS) in creating job advertisements for personnel selection, considering expectations of employee-employer relations in identifying the best job fit employees (Rose, 2008).

Methodology

The job qualification levels as well as the job benefits mentioned in the job advertisements can be revealing. In this research project, we will select the private sector's managerial, professional, and technical positions at different levels of approximately 3,000 job advertisements in the largest job ads online website available on https://www.myfuturejobs.gov.my/, under the management of the Ministry of Human Resources (MOHR) and https://www.jobstreet.com/, Malaysia as the source for our empirical examination. The MOHR online job advertisement is one of the most important national recruitment channels and should therefore offer representative results. The current job advertisements will be collected for the year of 2024. All related private sector position advertisements (as per above mentioned) from all levels are to be included in the examination. The focus would be on the managerial positions only. The skills, knowledge, abilities, and other attributes will be ranked accordingly and specify their weightage and degree level.

The results gained are then further justified by the selected employers and MOHR Personnel to finalize findings for endorsement purposes. The project spans one year to conduct the study, construct the job-based curriculum framework, and implement the training and development activities, which will be completed by the end of 2025 (July – September 2025).

The proposed Job-Based Curriculum Framework (Figure 2) will be developed through an in-depth analysis of 3,000 online job postings. This framework will integrate critical elements such as skills, knowledge, abilities, and other attributes, assigning weightage to each based on their relative importance. The degree of importance and ranking levels for these attributes will be determined by examining job market demands as reflected in the postings. By systematically assessing the relevance of each skill, knowledge, and ability, the framework aims to align academic curricula more closely with industry expectations. This alignment will help ensure that graduates are equipped with the most essential competencies, facilitating their professional growth and increasing their employability in an increasingly competitive job market.

The information derived from job descriptions (JD) and job specifications (JS) serves as a critical foundation for developing tailored curricula for various professions. Employers and industries provide detailed descriptions of their employment needs, outlining specific qualifications, skills, and competencies required for different roles. These comprehensive job postings are designed to precisely define the expectations for a particular position and help identify the most suitable candidates.

By systematically analyzing the job requirements presented in JDs and JSs, curriculum developers can gain valuable insights into the essential skills, knowledge, abilities, and other competencies necessary for each job. This allows educators to design curricula that align with industry standards and address the evolving demands of the labor market. For example, if a job description emphasizes strong communication skills, technical expertise, or specific software proficiency, the curriculum can be structured to incorporate these elements, ensuring that graduates are well-equipped to meet industry expectations.

Additionally, this approach helps bridge the gap between academic programs and real-world job requirements, ultimately improving graduate employability. By continuously incorporating insights from JDs and JSs into curriculum development, higher education institutions can ensure their programs remain relevant and responsive to the changing needs of industries. This dynamic curriculum design process, informed by detailed job analysis, supports the creation of

educational pathways that produce job-ready graduates with the competencies required to excel in their chosen careers.

The proposed Job-Based Curriculum Framework will undergo an assessment for endorsements to validate the findings with selected employers and personnel from the Ministry of Human Resources to examine the SKAOs (Job Description and Job Specifications with Assigned Level/Ranking, Degree of Importance, and Corresponding Weightage) in addressing the gaps to formulate the relevant Training & Development Programs
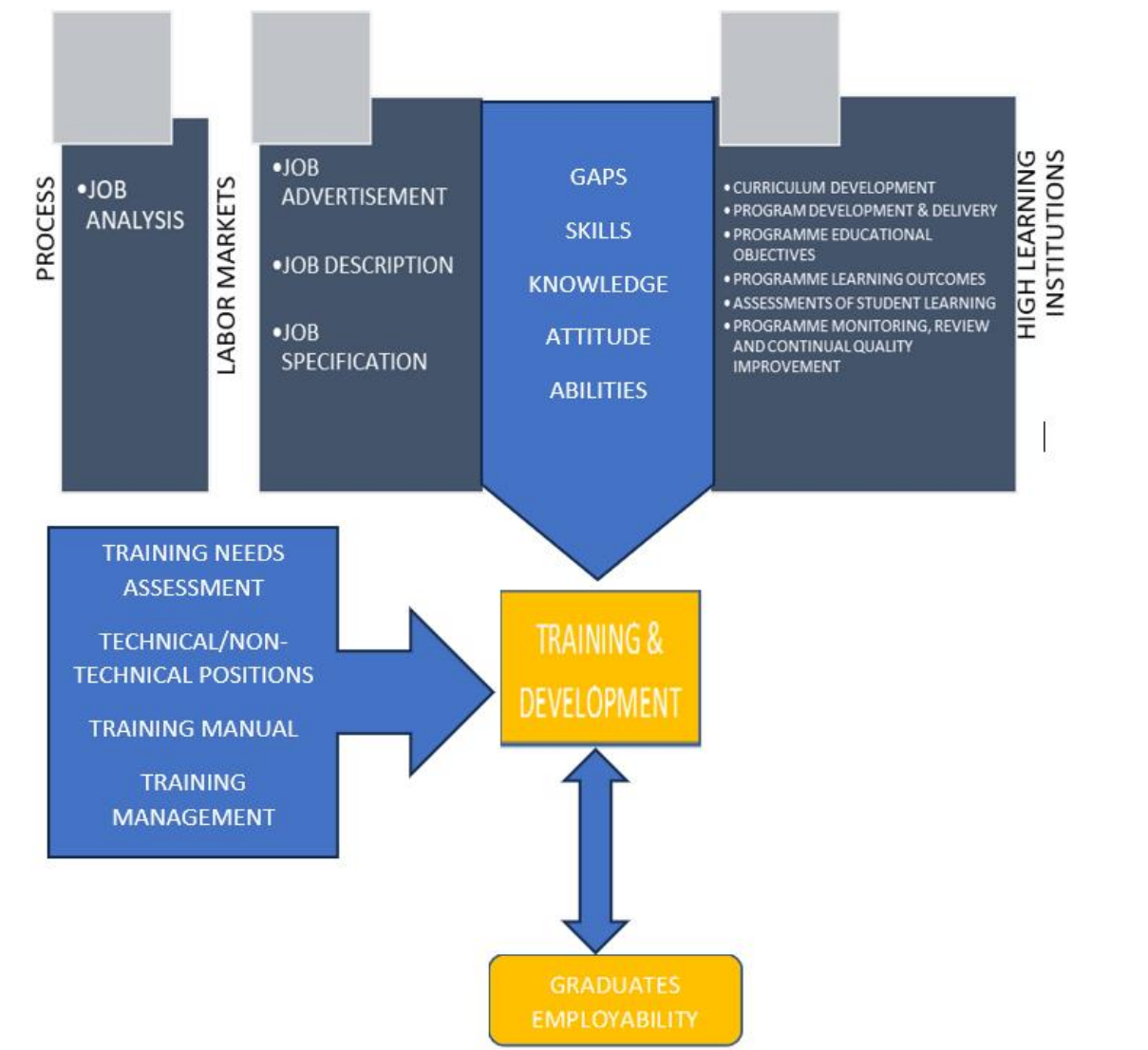

Figure 2: Proposed Job-Based Curriculum Framework

Job Ads (Technical Position)

A job advertisement provides employment data that could compile a comprehensive job description (JD) and job specification (JS) to enable to identification of gaps in Skills, Knowledge, Abilities, and Other Attributes (SKAOs), which can then be used to determine appropriate training programs to address these gaps. The following job advertisement is attached to explore the job description (JD) and job specification (JS) in detail by incorporating

ranked levels of responsibilities, each assigned a degree of importance and corresponding weightage. This comprehensive approach enables a deeper analysis of Skills, Knowledge, Abilities, and Other Attributes (SKAOs) gaps by clearly defining the critical competencies required for the role. It facilitates the identification of specific areas where the current workforce may fall short, allowing for the development of targeted training programs to bridge those gaps and enhance performance in key areas. This structured methodology ensures that training initiatives are aligned with the actual demands of the job, leading to more effective skill development and improved job performance.

Figure 3: Job Postings

Business Development Engineer / Manager
CETM Electrotest Sdn Bhd

Quick apply   Save

CETM ElectroTest Sdn Bhd is expanding & in line with this growth we are looking for a Business Development Engineer / Manager to join our team! As a Business Development Engineer / Manager, you will be mainly responsible for identifying new business opportunities, fostering strategic partnerships, and driving growth initiatives.

What do we need you to do?

- Identify and research potential clients
- Develop and maintain client relationships
- Coordinate with sales teams to develop mutually beneficial proposals
- Negotiate contract terms with clients and communicate with stakeholders
- Monitor project teams to ensure contracts are executed as agreed
- Gather useful information from customer and competitor data
- Make and give presentations to prospective clients and internal executives
- Create and implement processes and policies to support the overall business
- Track, identify and add qualified prospects to sales pipeline
- Develop and manage strategic partnerships to grow business
- Track and report on the status of proposal components
- Conduct ongoing market research
- Work with the pricing department to create rate proposals
- Drive the end-to-end sales process
- Prepare and submit sales contracts
- Collaborating with other business units

Figure 4: Job Description (JD)

Business Development Engineer / Manager
CETM Electrotest Sdn Bhd

Quick apply   Save

What do we need from you?

- Minimum of a Bachelor's Degree in electrical engineering, mechanical engineering or similar field
- At least 2 Year(s) of working experience in the related field is required for this position.
- Proven working experience as a business development manager, sales executive or a relevant role
- Proficiency in English
- Market knowledge
- Communication and negotiation skills
- Ability to communicate well with other members
- A desire to continually upgrade technical knowledge
- Candidate with below experience and knowledge are advise to apply

  - CCTV/Network equipment or installation
  - Proficiency in automation equipment
  - Experience with robotics, AI and machine learning
  - Experience with project management
  - Strong leadership and problem-solving skills
  - Excellent organizational skills and attention to detail
  - Strong analytical skills

Figure 5: Job Specification (JS)

The above are examples of job duties and responsibilities or job tasks for the position of Business Development Engineer/ Manager

The term "What do we need you to do?" is generally associated with the "Job Descriptions". For further clarification, SKAOs are as per the following table;

Table 1: SKAOs (Job Description with Assigned Level/Ranking, Degree of Importance, and Corresponding Weightage & Training & Development Programs

No.	Items	Skaos	Details
1	No. 1 to 3 & 9, 14 & 16	Customer Relationship Management (CRM) and Personal Selling	Suggesting "An Introduction to CRM and Personal Selling" for Technical Candidates (Engineering Graduates)
2.	No. 4, 5 & 10 & 15	Business/Sales Contracts	Understanding the Business Contracts
3.	No. 6 & 9 & 11, 12 & 13	Market Demand and Competition Analysis & Business Proposals	Conducting Market Research and Pricing Strategies
4.	No. 7	Presentation Skills	Embedded in most of the programs/studies
5.	No. 8	Drafting Business Policies and Processes	An Introduction to Organizational Policies for both fields
5.	No. 10 & 16	Managing Partnerships for Business Growth	An Introduction to Marketing Strategic Management (Engineering Graduates) Training
6.	No. 11	Developing Proposal; Tracking and Reporting	Drafting a Business Proposal Training
7.	No. 4, 5 & 16	Negotiating, Monitoring, and Collaborating for Business Clients/Teams/Units	Project Management Training

Based on these job tasks, the items required will be grouped according to their similarities and differences. The positions will be grouped according to the specified fields (similarities of educational background and tasks/responsibilities) such as Marketing, Human Resource Management, Operations, Mechanical/Civil/Chemical and Electrical, Sales, Customer Services & etc. Generally, for example, the Marketing Position has been named with different posts up to 15 to 20, as well as the Sales Positions have more than 20 posts. New positions are being introduced in the job market, for example, "Business Development Engineer" which a wide SKAOs GAP identified where training will be offered to the engineering students on the business management codes/subjects. It is estimated that with the 3,000 positions examined will end up with less than 30 positions only.

The term "What do we need from you" is associated with the Job Specification as per the following table which normally has the level/Rank. Degree of importance and weightage according to the "specified job requirements with certain level".

Table 2: Skaos (Job Specification With Assigned Level/Ranking, Degree Of Importance Correspondings Weightage & Training & Development Programs)

| JOB SPECIFICATION				
KNOWLEDGE	Level /Ranking	Degree of Importance	Weightage	Remarks (Suggested Training Programs)
Degree in Engineering	**LEVEL 3**	1	5 to 6	
Experiences	**LEVEL 1 (2 years)**	2	3 to 4	
English Language	**LEVEL 5 Proficiency (a high degree of skill; expertise)**	5	9 to 10	**Training for Advanced English Communication Workshop**
Market Knowledge (Biz Opportunities, Strategic Partnerships & Driving Growth Initiatives) Major Requirements	**LEVEL 4**	4	7 to 8	**Market Demand Analysis & Strategic Partnerships (TOP PRIORITY TRAINING) For Beginner & Intermediate**
SKILLS				
Communication & Negotiation Skills	**LEVEL 3** **Able to communicate well**	3	4 to 5	**Comm & Negotiation Skills for Intermediate Level**
Organization Skills	**LEVEL 5 (Excellent Communicator)**	5	9 to 10	**Strategic Management Training**
Operate Automation Equipment	**LEVEL 5 (Proficiency)**	5	9 to 10	**Operating Automation Equipment (Programmable/Flexible/Process & Integrated Automation). These skills are normally embedded in the HEI programs**
ATTRIBUTES				
Leadership/Problem Solving & Analytical Skills	**LEVEL 5 (Strong skills)**	5	9 to 10	**Managerial Skills Training Program**
ABILITIES				
Robotics, AI & Machine Learning	**LEVEL 3 (Basic Experience)**	3	4 to 5	**IR 4.0 Skills Development Training Program**
Project Management	**LEVEL 3 (Basic Experience)**	3	4 to 5	
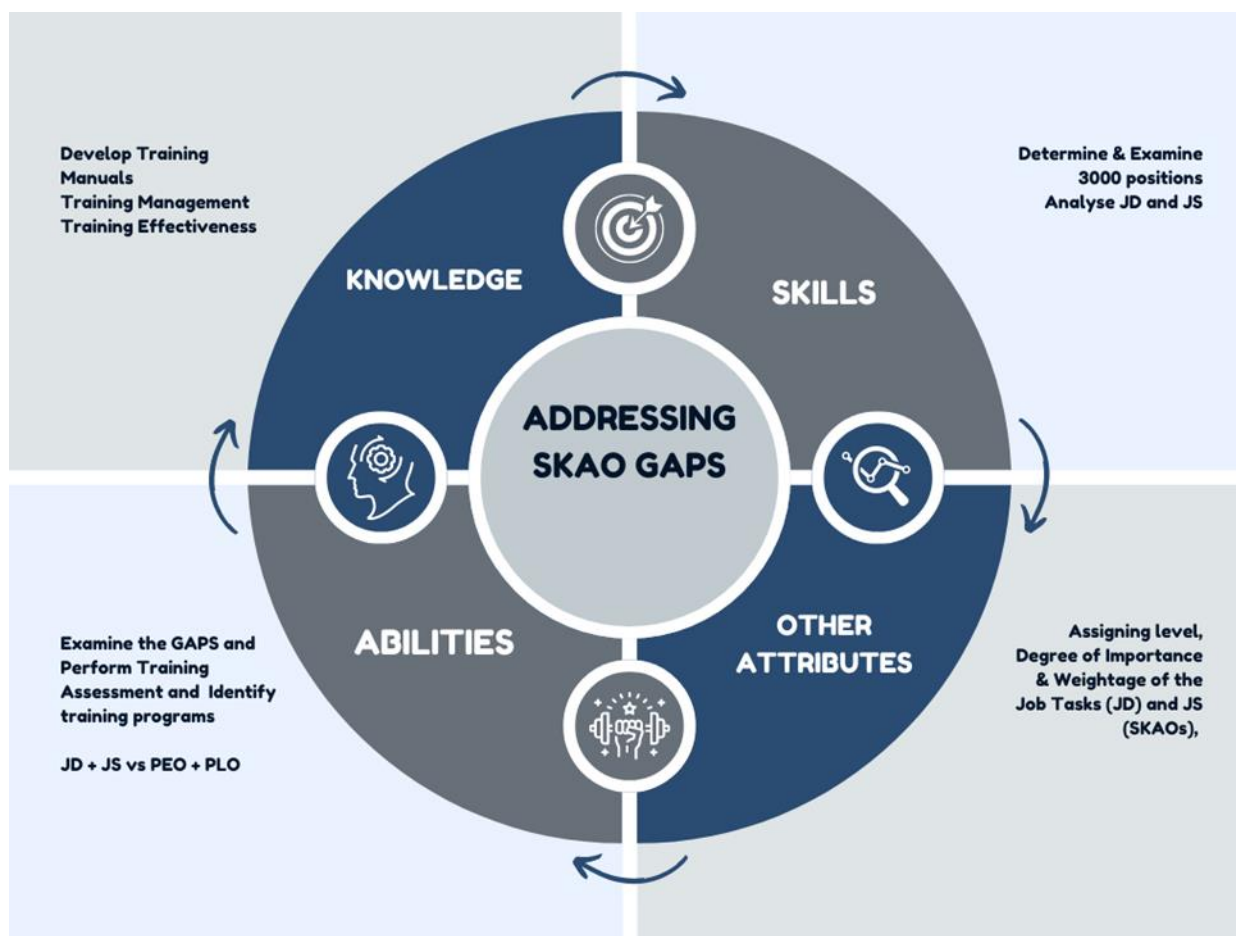
Figure 6: Schematic Framework For Job-Based Curriculum Development Methodology With SKAOs Integration (JS)

Significance of Study, Aims, and Targeted Community

The main aim of conducting this study is to develop a job-based curriculum framework. The job-based framework would align graduates' SKAOs (Skills, Knowledge, Abilities, and other competencies) with labor market requirements. This alignment boosts graduates' marketability by ensuring they develop the essential SKAOs needed to meet industry demands. Consequently, training programs are identified and consequently, the Training Manuals will be developed, managed, and assessed its effectiveness. Generally, higher education institutions must cater to workforce needs by equipping graduates with pertinent SKAOs. In addressing the gaps, an analysis of the JD and JS versus the Program Educational Objectives and Program Learning Outcomes will be conducted. The SKAOs identified by the job-based framework will guide the creation of reliable, accurate, and comprehensive training programs for SKAOs enhancement as well as would be the guidelines for future educational curricula.

The proposed framework will list down the present skills, knowledge, abilities, and other attributes needed for a job. It would divide the job components according to their weightage, degree of importance, and level/ranking. The job-based curriculum framework will guide not only Higher Education Institutions (HEIs) in developing relevant curricula based on industry requirements but also serve as a reference for the Malaysian Qualifications Agency (MQA) and

the Ministry of Human Resources (MOHR) in offering the right training program for the jobless graduates.

The analysis of skill, knowledge, abilities, and other attributes is carried out to align with the Person-Job Fit (PJ fit). This kind of fit guarantees that workers possess the technical know-how to carry out their given tasks. The goal of selection is to identify candidates who possess the appropriate behaviors and skills for a vacant position. Assessment of candidates' most important traits and abilities to fit the key components of the work setting is part of the selection process. By conducting the job analysis, these work requirements are identified. For organizations emphasizing PJ fit, it is important to select employees based on specific skills, knowledge, and abilities (Edwards, 1994). Employees who have the skills, knowledge, and abilities to perform the designated job tasks can perform the tasks more proficiently than those without those skills. Job analysis and traditional selection procedures form the backbone to guide this type of assessment. These tools have predictive validity for individual job performance as long as appropriate objective measures are used to assess skills, knowledge, and abilities (Schmitt & Landy, 1992).

The job-based curriculum framework aligns graduates' SKAOs with labor market requirements. is to boost graduates' marketability by ensuring they acquire the essential SKAOs needed to meet industry demands. Consequently, higher education institutions must adapt their curricula to cater to workforce needs, equipping graduates with the pertinent SKAOs. The first objective of the Job-Based Curriculum Framework is to facilitate the development of skills, knowledge, abilities, and other attributes of the jobless graduates and ALUMNI through the integration of the Education 4.0 applied concepts, networked approach, and digitalization of higher education institutions towards the establishments of the training manual for teaching and learning practices associate to SKAOs. Lack of familiarization significantly affects the learning curve of junior engineers at work and shows a disconnection between what is learned at university and what is required in the workplace. The second objective is to facilitate graduates' transition into the workforce by addressing SKAOs (Skills, Knowledge, Abilities, and Other Attributes) gaps within the Education 4.0-Industry 4.0 framework. This can be achieved by implementing a strategy that aligns with the job descriptions (JD) and job specifications (JS) outlined in job postings or advertisements. The proposed framework will outline the present skills, knowledge, abilities, and attributes required for various jobs. It will categorize job components based on their weightage, degree levels, and ranking. This structured approach will guide the creation of reliable, accurate, and comprehensive educational curricula.

The significance of this study lies in addressing the gaps between graduates' SKAOs and industry job requirements through the job-based curriculum framework. By identifying and bridging these gaps, the framework will provide training and development assistance to graduates, enhancing their employability. The targeted participants for this initiative are jobless alumni and final-semester students in the Northern Region Public Universities. The targeted number of participants is 3000 final semester graduates and ALUMNI. Training programs will be provided by Higher Education Institutions (HEIs), managed by the UiTM in collaboration with the Ministry of Human Resources, which is responsible for skills development, labor, occupational safety and health, trade unions, industrial relations, industrial court, labor market information analysis, and social security.

By focusing on the aims and targeted participants, this study seeks to enhance graduate employability through a job-based curriculum framework. Addressing the gaps in graduates' SKAOs and industry requirements will ensure that graduates are better prepared for immediate employment, thereby benefiting both the graduates and the labor market.

Conclusion

Job advertisements serve as a valuable source of data for identifying the critical skills, knowledge, abilities, and other attributes (SKAOs) required for various positions. This data is instrumental in shaping a job-based curriculum framework that aligns with the demands of the industry. Higher Education Institutions (HEIs) can leverage this information to address the growing need for a workforce that meets employers' expectations in terms of job-specific competencies. Job descriptions (JDs) and job specifications (JSs) provide comprehensive details on the necessary SKAOs, including their weightage, components, and the degree of proficiency required for different positions. These insights are crucial for developing a curriculum that reflects the current labor market and anticipates future trends.

In today's rapidly evolving job market, curriculum development must be an ongoing, dynamic process. Continuous data collection on job-related requirements is essential for keeping educational programs relevant and effective. By systematically integrating labor market demands into curriculum planning, HEIs can ensure that graduates are well-prepared for employment, and equipped with the competencies that industries are actively seeking. This proactive approach not only enhances graduates' marketability but also helps to address the skills mismatch that is increasingly prevalent in the labor market.

The proposed job-based curriculum framework incorporates findings from a comprehensive analysis of 3,000 online job postings, identifying the essential skills, knowledge, and attributes that employers prioritize. Weights and ranking levels for these competencies are determined based on their importance in the marketplace. This framework offers HEIs actionable insights into how to tailor their curricula to better prepare students for employment, emphasizing the skills most in demand by employers. As the job market needs to continue to evolve, the curriculum must also be flexible enough to adapt to these changes, ensuring that graduates remain competitive.

Moreover, this initiative targets final-year students and alumni from public universities in Malaysia's Northern Region. Through collaboration between these universities, gaps in SKAOs can be identified, allowing for targeted interventions in the form of specialized training programs. These programs, managed by UiTM and would support the Ministry of Human Resources (MOHR), aim to enhance the employment prospects of jobless graduates and ALUMNI. By addressing specific skills gaps and aligning educational outcomes with job market requirements, these potential training initiatives strive to improve graduates' marketability and expedite their entry into the workforce.

Recognizing the rapid changes in job markets, curriculum development should be an ongoing process, continuously collecting data on companies' job-related requirements to maintain an efficient, up-to-date, and comprehensive curriculum. By integrating labor market perspectives, HEIs can develop curricula that meet industry needs and adapt to market changes. The target market for this initiative includes final semester graduates and alumni of Northern Region public universities will attain its objectives through collaboration among these universities. Assessing the SKAOs gap would identify relevant training needs, ensuring graduates are

equipped with the necessary skills as per job specifications and descriptions. Training providers from HEIs managed by UiTM will support the initiative of Ministry of Human Resources (MOHR) skill development programs aiming to expedite employment and enhance the marketability index among jobless graduates/ALUMNI.

In conclusion, the development of a job-based curriculum framework grounded in labor market data offers a promising approach to bridging the gap between education and employment. By continuously aligning curricula with industry needs, HEIs can play a pivotal role in reducing unemployment rates, particularly among graduates, and ensuring that their educational offerings remain relevant in an increasingly competitive and fast-changing job market. This approach highlights the importance of collaboration between academia, industry, and governmental bodies to create a workforce that is adaptable, skilled, and ready to meet the challenges of the 21st-century labor market.

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