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IT Talent Transformation for Vocational Students: The Dilemma of Screening or Entrance Test?

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Abstract

In an era where digital competencies are increasingly pivotal, the need for robust screening tests that accurately assess programming and computational skills has become paramount. This concept paper explores the global landscape of screening tests, with a particular focus on their application in identifying potential IT talent. It begins by reviewing diverse international implementation for screening tests, analyzing their strengths, limitations, and cultural adaptability. The paper then narrows its focus to the Malaysian context, where the rapidly growing tech industry necessitates a localized approach to talent assessment. Drawing on global best practices, this paper discussed the impact of screening test for Malaysia that aligns with the country's educational objectives and industry needs. By integrating international insights with local nuances, this screening test aims to enhance the efficacy of vocational college admissions, ensuring that Malaysia is well-positioned to cultivate future IT professionals who can compete on a global stage. The discussion of this research supports the idea that the brainstorm and invention not only address the technical competencies required for IT careers but also considers broader educational and societal factors. This will make it a comprehensive tool for identifying and nurturing Malaysia's next generation of tech talent. Further research should be done to investigate the potential of using screening tests with different style of test rather than applying conventional test.

Keywords: Screening Test, Programming, Computational Thinking, IT Careers, Vocational College.

Introduction

In today's rapidly evolving digital landscape, the ability to harness and apply programming and computational skills has become a critical determinant of individual and national success (Kang, 2024; Salmiah Salleh Hudin, 2023). The Fourth Industrial Revolution (IR 4.0), characterized by a fusion of technologies blurring the lines between the physical, digital, and biological spheres, has heightened the demand for skilled IT professionals who can innovate and drive technological progress (Ayu Pramita & Sardjono, 2024; Chik et al., 2024). As a result,

educational institutions and industries worldwide are increasingly focused on identifying and nurturing talent in these domains from an early stage. Screening tests, designed to evaluate an individual's aptitude in programming and computational thinking, have emerged as essential tools in this effort.

The global landscape of screening tests is diverse, reflecting varying educational philosophies, cultural contexts, and industry needs. Countries with advanced digital economies have developed sophisticated frameworks that emphasize not only technical skills but also critical thinking, creativity, and adaptability qualities that are indispensable in a fast-changing technological environment (Laar, 2019; Martínez-Bravo et al., 2022). These invention ideas often integrate standardized testing with cognitive assessments in basic coding, programming, and computational thinking skills; and even psychological profiling to provide a holistic view of a candidate's potential.

Malaysia, with its ambitions to become a high-income, knowledge-based economy, stands at a critical juncture where the development of IT talent is both a national priority and a strategic necessity (Fahmy et al., 2022; Ramachandaran et al., 2024). The Malaysian education system, while robust in many areas, faces unique challenges in aligning its outputs with the demands of the global digital economy. As the nation seeks to cultivate a generation of IT professionals capable of contributing to and competing in the international arena, there is a pressing need for a screening test that is tailored to its specific educational and industrial contexts (Balas-Timar & Ignat, 2015; Huang et al., 2019).

This concept paper seeks to bridge the gap between global best practices in IT talent assessment and the localized needs of Malaysia. By conducting a comprehensive review of international screening models, this paper identifies key elements that contribute to the success of these frameworks, including their adaptability, inclusiveness, and alignment with industry standards. The paper then explores how these elements can be adapted to fit the Malaysian context, proposing a framework that not only assesses technical competencies but also aligns with Malaysia's broader educational objectives and societal goals.

By crafting a Malaysian framework for IT talent assessment, this paper argues for a balanced approach that integrates global insights with local realities. Such an approach ensures that Malaysia can develop a pipeline of IT talent that is not only technically proficient but also globally competitive and culturally grounded. This framework will serve as a critical tool for vocational colleges, universities, and industry stakeholders, enhancing the process of identifying and nurturing the nation's future IT leaders.

Concept of Entrance Test and Screening Test

Globally, various countries implement entrance test or exam for the qualification to get into the higher education system such as colleges, polytechnic college, and universities. Besides, several institutions are very keen to screen their candidates who will enroll into their special and profesional course to ensure they enroll in courses that align with their professional profiles, ultimately enhancing student satisfaction and success rates. (Denysova, 2020; Eduardo et al., 2013).

Entrance tests are standardized assessments designed to evaluate a candidate's readiness and qualification for admission to a particular educational program, institution, or course (Furtado, 2023; Zwick, 2007). These tests typically cover a wide range of subjects relevant to the program or institution's academic focus. The primary goal of entrance tests is to ensure that candidates possess the necessary knowledge and skills to succeed in the chosen academic environment (Bichi et al., 2019; Zlatkin-Troitschanskaia et al., 2022). The entrance tests are characterized by several key features that distinguish them within the educational assessment landscape (Sievertsen, 2023). Firstly, they are highly standardized, meaning they maintain consistency in terms of content, administration, and scoring across all candidates. This standardization is crucial as it ensures fairness in the selection process, allowing all candidates to be evaluated on an equal footing (Caines & Engelhard, 2012).

Additionally, entrance tests typically offer comprehensive coverage, assessing multiple subjects or areas of knowledge that reflect the curriculum of the intended program (Stewart-Wells & Keenan, 2020). For instance, a university entrance test may include sections on mathematics, science, language skills, and analytical reasoning to evaluate a candidate's readiness for the academic challenges ahead (Malonisio & Malonisio, 2023). Another defining feature is their competitive nature; candidates are often ranked based on their scores, and this ranking plays a critical role in determining who gains admission, particularly in highly sought-after programs with limited available spots. Lastly, entrance tests function as gatekeepers, ensuring that only those candidates who meet a certain academic threshold are admitted. This gatekeeping role is vital in maintaining the quality and reputation of the institution or program, as it ensures that admitted students possess the foundational knowledge and skills necessary for success in their studies. Listed are examples of entrance exam such as Scholastic Assessment Test (SAT) for college admissions in the United States, Joint Entrance Examination (JEE) for engineering programs in India and A-Levels in the UK, which are used for university admissions.

Meanwhile, screening tests, on the other hand, are preliminary assessments used to identify individuals who possess certain skills, aptitudes, or potential for success in a specific field or profession. Unlike entrance tests, screening tests are not necessarily tied to the admission process of a particular program but are often used in broader contexts, such as identifying talent or determining eligibility for specialized training programs. In past studies involving the current five years, there are several studies that are of concern to researchers in the screening test or placement test of students mostly from the country from the United States of America (Bloem et al., 2021; Buzzetto-more & Alade, 2019; Ngo et al., 2021; Ockey et al., 2020; Zwick, 2019), United Kingdom (Silva et al., 2020), Korea (Van BAO & Cho, 2022) and China (Wei, 2020). These studies focus on placement and screening tests for admission to higher education institutions. One of the subjects focused on is English language skills.

Screening tests possess several key features that make them distinct from other forms of educational assessments. These tests are generally focused on specific cognitive skills, typically more focused in nature, concentrating on specific skills or attributes that are relevant to the area of interest (Huang et al., 2019). For example, a screening test designed to identify IT talent may emphasize programming skills, logical reasoning, and computational thinking. Another important feature is their role in early identification; screening tests are often administered early in the educational or career pathway to identify individuals who have the

potential to excel in a particular field. This early identification allows for targeted interventions, such as specialized training or mentorship, to nurture and develop identified talents.

Additionally, screening tests serve a diagnostic function, providing valuable insights into the strengths and weaknesses of candidates. This diagnostic information can be instrumental in guiding further education or career development. Unlike entrance tests, screening tests are generally less competitive; while they may be selective, the primary focus is on identifying potential rather than ranking candidates against each other (Merchant & Hart, 2023). Several screening test that been endorsed in various fields are talent identification programs for gifted students, aptitude tests used in vocational guidance or career counseling and coding challenges used by tech companies to identify potential hires. Table 1 highlights the key differences between entrance tests and screening tests.

Table 1
Comparison of Entrance Tests and Screening Tests

Aspect	Entrance Tests	Screening Tests
Purpose	To evaluate readiness and qualification for a specific academic program or institution.	To identify potential or aptitude in specific skills or fields, often for early intervention or talent development.
Scope	Broad and comprehensive, covering multiple subjects or areas of knowledge.	Focused, assessing specific skills, attributes, or aptitudes relevant to a particular field.
Standardization	Highly standardized to ensure fairness and consistency across candidates.	Can be standardized or tailored to specific groups or contexts.
Competitive Nature	Competitive, with candidates ranked based on scores to determine admission.	Generally non-competitive, with the focus on identifying potential rather than ranking.
Timing	Typically administered at the end of a schooling period or before entering a higher education program.	Often used early in the educational or career pathway for early identification and intervention.
Examples	SAT, JEE, A-Levels.	Talent identification programs, vocational aptitude tests, coding challenges.
Function	Gatekeeping, ensuring only qualified candidates gain admission.	Diagnostic and developmental, identifying candidates who may benefit from further training or support.

Discussion on Impact of Screening Tests on Vocational and Higher Education Outcomes

The implementation of a tailored screening test framework for IT talent in Malaysia holds significant potential for transforming vocational and higher education outcomes. This section delves into the multifaceted impacts such a framework could have, emphasizing the alignment of educational outputs with the dynamic needs of the IT industry. Figure 1 summarize the discussion on impact of screening tests on vocational and higher education outcomes.

1. Enhancing Student Selection Processes (Goldhaber et al., 2014)

a. Improved Candidate Fit: By integrating a screening test that accurately assesses programming aptitude and computational thinking, educational institutions can better identify candidates who possess the inherent skills and passion for IT. This ensures that students entering IT-related programs are more likely to succeed, reducing dropout rates and improving overall program effectiveness.
b. Diversifying Talent Pools: A well-designed screening framework can uncover latent talent in underrepresented demographics or regions. By doing so, it promotes inclusivity and ensures a diverse influx of perspectives into the IT sector, which is crucial for innovation.

2. Curriculum Alignment and Development (Bhaw & Kriek, 2024)

a. Tailored Educational Pathways: Insights gained from screening tests can inform curriculum developers about the existing competencies and gaps among incoming students. This allows for the creation of tailored educational pathways that address specific needs, ensuring that students are neither under-challenged nor overwhelmed.
b. Feedback Loop for Continuous Improvement: Regular analysis of screening test results can serve as a feedback mechanism. Educational institutions can adjust curricula in response to evolving industry demands, ensuring that course content remains relevant and up-to-date.

3. Bridging the Academia-Industry Gap (Büth et al., 2017)

a. Aligning Skills with Industry Needs: The IT industry is characterized by rapid technological advancements. A screening framework that evaluates competencies aligned with current industry standards ensures that graduates possess skills that are immediately applicable in the workforce.
b. Facilitating Industry Collaborations: Data from screening tests can highlight prevalent skill gaps, prompting collaborations between educational institutions and industry players to develop programs, workshops, or modules that address these deficiencies.

4. Enhancing Employability and Career Readiness (Torralba et al., 2024)

a. Targeted Skill Development: Understanding individual strengths and weaknesses allows educators to provide targeted support, fostering skill sets that enhance employability. This proactive approach ensures that graduates are not just academically qualified but are also career-ready.
b. Credentialing and Certification: Performance in standardized screening tests can serve as a credible metric for employers. Recognized certifications based on these tests can streamline recruitment processes

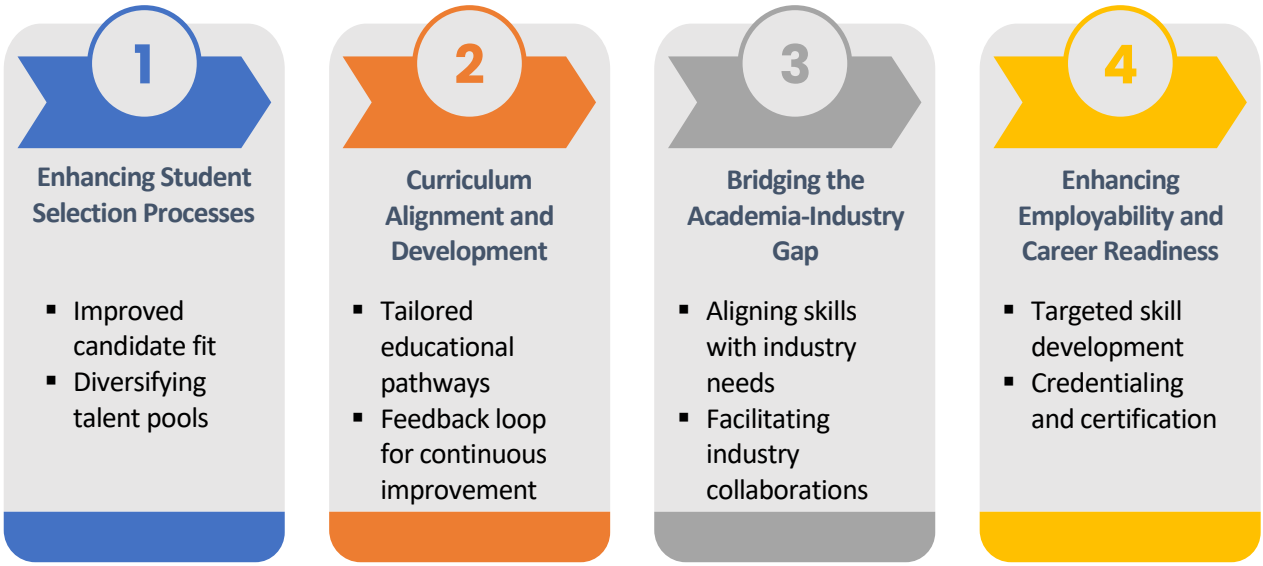

Figure 1 : Impact of Screening Tests on Vocational and Higher education Outcomes

Conclusions

The development and implementation of a tailored screening test framework for IT talent in Malaysia represent a strategic opportunity to enhance the alignment between educational outputs and industry needs. By drawing on global best practices while adapting to the educational context of Malaysia, this outline has the potential to significantly improve both vocational and higher education outcomes. The distinction between entrance tests and screening tests, as explored in this paper, underscores the importance of a focused assessment approach that identifies not only current competencies but also potential for growth in the IT sector. Through early identification and targeted support, screening tests can diversify and expand the talent pipeline, ensuring a more inclusive and representative pool of future IT professionals. Furthermore, the proposed framework emphasizes the need for continuous feedback loops between education and industry, enabling curricula to evolve in response to technological advancements and shifting market demands. Ultimately, the successful implementation of this framework will be pivotal in cultivating a new generation of IT talent that is both globally competitive and locally grounded, thereby supporting Malaysia's aspirations to thrive in the global digital landscape.

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