International Journal of Learning, Teaching and Educational Research
Vol. 24, No. 6, pp. 857-889, June 2025
https://doi.org/10.26803/ijlter.24.6.39
Received Mar 16, 2025; Revised Apr 23, 2025; Accepted Jun 14, 2025

Employment, Career Success and Learning Outcome Attainment of Computing Graduates in Klang Valley, Malaysia

Yogeswari Suppiah, **Rajermani Thinakaran***, **Marini Othman**
Faculty of Data Science and Information Technology, INTI International University, Negeri Sembilan,
Malaysia

Madina Yussubaliyeva
International Research Projects Office, D. Serikbayev East Kazakhstan State Technical University, Oskemen,
Kazakhstan

László Koloszár
Alexandre Lamfalussy Faculty of Economics,
University of Sopron,
Hungary

Abstract. This research explored the factors influencing computing graduates' transition from higher education into their career life and the effectiveness of educational programs in preparing graduates for job market challenges. The study used an exploratory sequential mixed-method approach, integrating literature review, and quantitative, and qualitative data collection. The study was executed in phases. Initially, a literature review and structured surveys were distributed to the computing graduates. Thereafter, an open-ended interview was conducted with the selected participants to get more relevant insights. The research contributes to the online survey data and the proposed model, which reflects all possible factors influencing graduate employability and career success. The results aim to inform educational institutions, policymakers, and industry stakeholders on the need for determination (grit') and resilience in educational strategies. The study emphasizes the importance of aligning with industry needs, cultivating soft skills, and developing a lifelong learning mentality to prepare graduates better. The study has limitations, including its regional focus, cross-sectional data, self-reported data, and potential bias. It also has implications for the United Nations' Sustainable Development Goals,

* Corresponding author: Rajermani Thinakaran; *rajermani.thina@newinti.edu.my*

particularly goal number 8, which emphasize decent work and economic growth. Future research should adopt a longitudinal approach and a more holistic lens to address access to equitable and inclusive employment outcomes worldwide. This research is crucial for policymakers, academic institutions, and industrial stakeholders to understand the factors affecting graduates' employment, career success, and program learning outcomes. It can guide the development of policies addressing post-COVID-19 challenges, and inform curriculum development, teaching strategies, and industry-relevant skills.

Keywords: Graduate employment; learning experiences; career success; program learning outcome; grit; resilience

1. Introduction

For many of the nations that have recently experienced sustained economic growth and a decrease in poverty, the development of human capital has been a key component. According to the World Bank (2022), the human capital of a nation is now even more strongly correlated with its riches due to the rapid advancement of technology. As industries across sectors such as manufacturing, agriculture, and services become more reliant on advanced human capital and technology-driven processes, there is a growing emphasis in the global economy on higher-level cognitive abilities. Skills such as advanced problem-solving, socio-emotional intelligence, and self-directed efficacy are increasingly seen as critical assets.

The Malaysian government has been implementing programs to bolster human capital to foster rapid and inclusive economic growth in a rapidly changing environment. These initiatives aim to equip the economy with essential knowledge, abilities, and skills. Enhanced levels of human capital will facilitate the failing areas in attracting the necessary investment to generate additional employment opportunities that require intermediate and advanced skills (World Bank, 2022). Malaysia's urbanization rate has been steadily increasing, with the Klang Valley being a key driver of this trend. This rapid urbanization has implications for the job market and the demand for skilled labor in the region.

Over the past 20 years, graduate employability has dominated the landscape of worldwide higher education policy. Governments view higher education as guaranteeing a trained labor force that is prepared for the workforce; students are calling for more financial returns on their "investments" in higher education related to employment; and graduate labor market results are becoming a crucial factor in many nations' regulatory and ranking systems (World Bank, 2022).

Worldwide, COVID-19 has had a significant effect on the job market for recent graduates. There are predictions of a worldwide recession, falling gross domestic product in several nations, and growing unemployment rates. Past experiences demonstrate that graduates who try to enter the workforce during such periods not only encounter major early obstacles but also run the risk of seriously damaging their long-term career paths and lifetime earnings (World Bank, 2022).

It is widely acknowledged that higher education and training institutions play a crucial role in Malaysia's social, economic, and political development by producing outstanding citizens, a highly skilled and talented labor force, and new knowledge. Malaysia's national education policy has served as a general framework for these advances. The Malaysia Education Blueprint 2015–2025 (Higher Education) complements the policy by outlining accountable ministries, institutions, agencies, plans, strategies, and key performance indicators within several robust supporting legal frameworks. Setting qualification criteria for all degrees in higher education and other fields is one of the main functions of the Malaysian Qualifications Framework, which was authorized by the Malaysian Qualifications Agency (2017).

Asada et al. (2017) stated that studies conducted by the Malaysia Productivity Corporation highlight the importance of addressing skill mismatches and improving educational outcomes to enhance employability. For graduates, the transition from school to the workforce is a crucial time in their life. To get a job offer and move forward in their career, people need the skills and traits required by today's competitive, evolving work market. Skill mismatches and deficiencies in educational achievement should be dealt with to improve employability.

The career success of a graduate can be affected by various factors, from personal traits to external aspects. A few of the determinants, such as educational background, skills and competencies, work experience, and striking the right tone during group discussions, could impact career status after graduation and meet industry requirements (Misni et al., 2020). Yun and Beh (2024) emphasized the urgent need for flexible policies and targeted educational efforts that prepare graduates with the necessary competencies and a resilient mindset to thrive in the rapidly changing job landscape shaped by the post-pandemic era.

Therefore, this study bridged the gaps by focusing on research discussing variables such as graduates' employment, career success, and program learning outcomes (PLOs). While there have been studies conducted in other nations, this is uncommon in Malaysia because of the unique situation it faces currently, such as the post-COVID effect and global climate change. This study considered the uniqueness of the Malaysian context and evaluated the relationships among all possible constructs and hypotheses and proposed an integral model that is resilient and adaptive.

The study selected areas that would offer rich knowledge that would assist industry stakeholders, educational institutions, and policymakers in creating enhanced employability solutions and career success strategies among graduates. This would potentially contribute towards sustainable economic development within Malaysia. Taking cognizance of the changing factors derived from recent global phenomenon, the research's objective was to explore the determinants impacting graduate employability and their career success.

2. Literature Review

Graduates' lives undergo a critical turning point when they go from higher education to the workforce, especially in vibrant cities such as Malaysia's Klang Valley. It is imperative for stakeholders who are committed to developing a skilled workforce and maintaining economic growth to comprehend the complex aspects that influence graduates' employment prospects, career advancement, and achievement of PLOs.

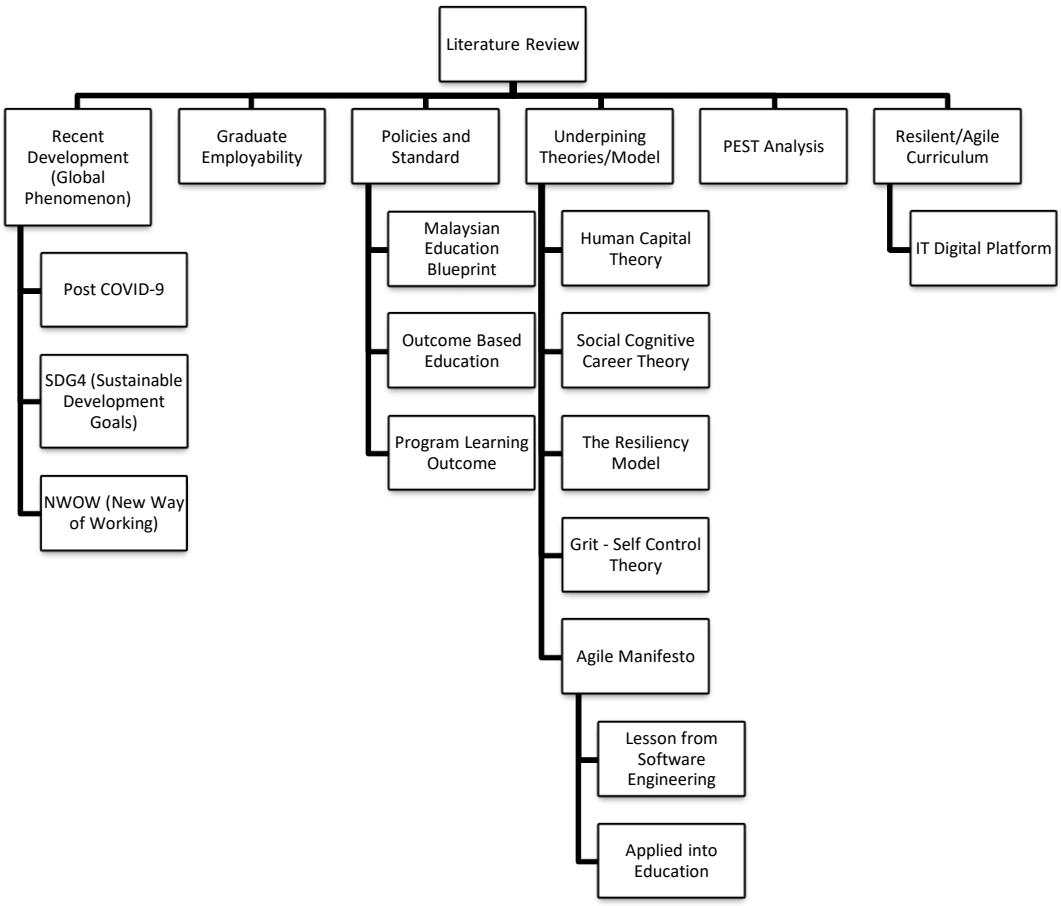

Figure 1: Literature Review Outline

Figure 1 presents a structured overview of the literature review, organized around six key domains that frame the discussion on graduate employability. The first domain, recent development (global phenomenon), highlights critical global trends shaping education and employment landscapes, including the ongoing impact of the COVID-19 pandemic, the objectives of the Sustainable Development Goal (SDG8), and the shift towards the New Way of Working. These developments serve as catalysts for rethinking graduate readiness and adaptability.

The second domain, graduate employability, focuses on understanding the complex factors that influence a graduate's transition into the workforce. The third domain, policies and standards, includes national initiatives such as the

Malaysian Education Blueprint, outcome-based education, and PLOS, which aim to align educational practices with evolving industry expectations.

The fourth domain, underpinning theories and models, provides the conceptual foundation for the research. It incorporates frameworks such as human capital theory, which links education to economic productivity; social cognitive career theory, which addresses the influence of self-efficacy and career decision-making; the resiliency model, which highlights psychological adaptability; and grit–self-control theory, which emphasizes perseverance and discipline. The agile manifesto, originally developed for software engineering, is also adapted to promote flexibility in curriculum development, encouraging iterative and student-centered learning. Its principles are further contextualized through lessons from software engineering, applied directly to educational settings.

The fifth domain, (Political, economic, social and technological) analysis, expands the focus by examining broader macro-environmental influences, including political, economic, social, and technological conditions that affect graduate outcomes. Finally, the sixth domain, resilient/agile curriculum, explores how digital platforms and agile strategies enhance institutional responsiveness, supporting learners in developing the competencies needed to thrive in a dynamic and unpredictable labor market.

2.1 Post COVID-19

According to Rahman et al. (2020), the COVID-19 pandemic that swept the globe in the first quarter of 2020 emphasized the issue of graduate employment. The movement control order made it harder for some businesses to pay their employees' salaries. As a result, employees were retrenched to reduce operating expenses and employers institute a hiring freeze. As a result, the pandemic affected the economy negatively. Both graduate unemployment and underemployment rates rose. The post-COVID-19 effect has resulted in a decrease in skilled job opportunities, which has contributed to the rising trend of underemployment among graduates.

The onset of the COVID-19 pandemic in early 2020 brought about widespread disruptions to societal and economic functions across the globe, and Malaysia was no exception. The enforcement of movement restrictions, closure of businesses, and suspension of numerous economic activities not only altered daily life but also contributed to a sharp rise in unemployment rates. Many companies were forced to shut down operations temporarily or permanently, which significantly reduced available job opportunities and created a more competitive and uncertain labor market environment (Bikar et al., 2023).

A recent study conducted by Kamaruddin et al. (2023) revealed that a significant number of graduates from University Sains Islam Malaysia are currently employed in areas that do not align with their original field of study. Moreover, it was found that many of these graduates experienced at least one job transition during the height of the COVID-19 pandemic. This indicates a level of instability

and adaptability in the job market brought about by the unprecedented global crisis.

The study also identified several critical factors that have a notable influence on employment trends during the pandemic period. This includes demographic characteristics such as gender, as well as job-related elements such as the sector of employment, geographic location of the job, income level, and whether the graduates were involved in the graduate employability program. According to World Bank (2022), Malaysia's labor market has started to recover after the extended economic slowdown caused by the COVID-19 pandemic and the accompanying travel restrictions.

Although the unemployment rate remains above the pre-pandemic figure of 3.3 percent recorded in the fourth quarter of 2018, it showed a slight improvement, declining from 4.3 percent in Q4 2021 to 4.1 percent in Q1 2022. Alongside this, the labor force participation rate experienced a modest rise of 0.3 percentage points. While unemployment across all age groups has contributed to the overall rate, youth unemployment continues to be a concern, holding steady at a high rate of 11.1 percent since the previous quarter.

In 2021, the COVID-19 pandemic continued to pose challenges to countries worldwide, including Malaysia. The government implemented various strategies to protect lives, reduce the public health burden, and ensure livelihood. The National Economic Recovery Plan (PENJANA), otherwise known as *Pelan Jana Semula Ekonomi Negara*, was initiated by the Malaysian government incorporated stimulus package, with initiatives such as the Hiring Incentive Programme and PENJANA KPT-CAP Programme addressing job creation and unemployment.

Graduates Statistics 2021 provides statistics on graduates, including salaries and wages, from various data sources. Graduates are defined as individuals aged 15 and older with the highest certificates from universities, colleges, or polytechnics (Department of Statistics Malaysia, 2021).

2.2 Global Climate Change

A study by Rahman (2018) emphasized that climate change stands among the most pressing environmental challenges confronting humanity today. It has become a critical issue that occupies a central position on the global policy agenda. Although Malaysia is often perceived as being relatively shielded from extreme climate-related disasters, the country has nonetheless begun to experience an increase in the frequency of mild climate-induced disturbances in recent years. Various potential impacts of climate change in the Malaysian context have been identified, including rising sea levels, declining agricultural yields, the spread of diseases among forest ecosystems, loss of biodiversity, shoreline erosion, and more frequent and intense flooding.

2.3 Challenges of IT Professionals and Technology Churn

In recent times, the nature of the workplace has experienced continuous and significant transformation, especially concerning the types of tasks performed, the technologies and processes employed, and the skillsets necessary to sustain

organizational productivity and competitiveness. Several key drivers have contributed to this shift, notably large-scale technological advancements, demographic transitions, and unforeseen global events such as the COVID-19 pandemic. These evolving dynamics have further complicated the balance between the supply of skills from graduates and the actual demands of the labor market.

As a result, educational institutions and training providers are under mounting pressure to revisit and revise their curricula to reflect the needs of the modern workforce better. This includes integrating high-demand technical capabilities along with essential socioemotional skills. Moreover, there is an increasing emphasis on employing innovative teaching strategies—often referred to as signature pedagogies—that are adaptable to rapidly changing content requirements. One of the major catalysts of these changes is the Fourth Industrial Revolution (IR 4.0), which continues to introduce disruptive digital innovations across sectors.

In response, there is a growing call for pedagogical approaches that emphasize learner-centered methodologies, which shift the responsibility of acquiring new skills from instructors to students. These methodologies aim to develop learners' capacities for lifelong learning, critical thinking, and effective collaboration across disciplines. Such approaches are particularly important for preparing future professionals to solve novel and complex problems that may emerge as a result of technological disruptions brought about by IR 4.0 (Mukuni, 2023).

2.4 Theoretical Framework

The human capital theory by Becker (1964) suggests that individuals make deliberate investments in their education, training, and skill development, often at their own expense, with the aim of enhancing their productivity, employability, and long-term earnings prospects. This theory views knowledge, skills, and personal attributes as forms of capital that yield economic returns in the form of wages and career progression, which accumulate gradually over time. Its relevance is particularly notable among computing graduates in the Klang Valley, an area widely recognized as Malaysia's digital and economic hub.

In this highly competitive environment, many people pursue higher education in sought-after fields, such as data science, software engineering, and cybersecurity, hoping to secure stable and well-paying jobs. Nevertheless, even with technical qualifications, some graduates continue to face challenges in the job market. These include mismatches between their skills and industry needs, limited practical experience, and situations of underemployment where their roles do not fully reflect their qualifications.

2.5 PEST Analysis Framework

The political, economic, social, and technological (PEST) analysis framework in Figure 2 was used to investigate the factors affecting graduates' employment, career success, and PLO attainment in Klang Valley, Malaysia. This allowed the researchers to gain insight into the larger macro-environmental factors affecting the labor market, educational landscape, and socio-economic conditions. The

PEST analysis offers a methodical way to examine the outside elements influencing a certain situation. Political considerations include laws and policies from the Malaysian government that affect employment, education, and the growth of industries. Other than that, legal and environmental factors play a vital role in this study. This refers to laws and regulations such as employment laws and environmental regulations, environmental regulations, sustainability initiatives, and the impact of climate change.

Economic factors, such as gross domestic product growth, inflation, and unemployment rates, have a direct impact on the job market and the career prospects available to graduates in Klang Valley. Economic downturns may result in fewer job opportunities and more intense rivalry for available positions (Ramasamy, 2014). International trade agreements and economic globalization can impact the kinds of skills and competencies for which employers are looking, presenting graduates with both opportunities and problems (Mok, 2016). Social factors encompass cultural norms, demographics, and societal values. In the context of Klang Valley, social trends, such as the increasing importance of education and the growing diversity of the workforce, may impact career choices and opportunities for graduates (Kaur, 2016).

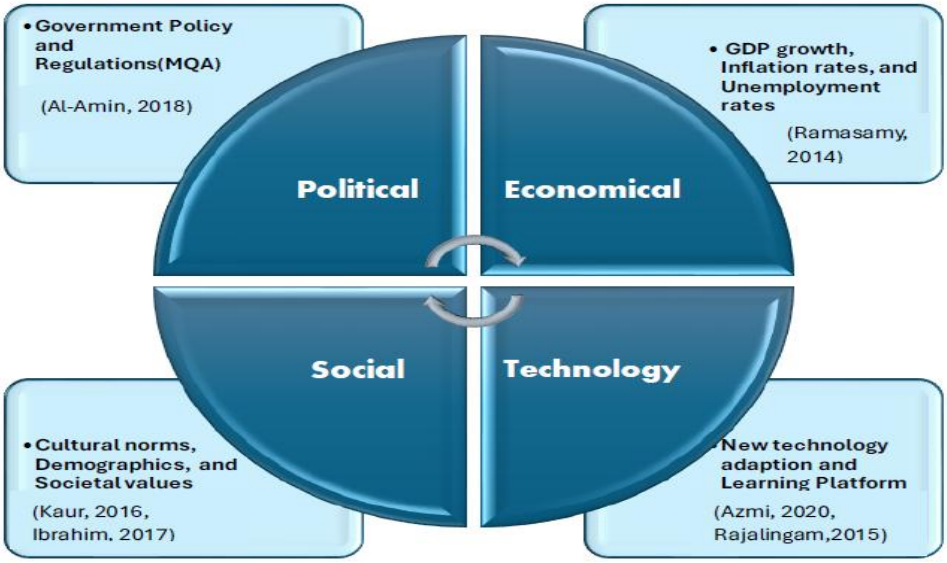

Figure 2: PEST Analysis

2.6 The Conceptual Model

Figure 3 presents a detailed theoretical framework for graduate career success, focusing on employability and resilience (RE). The key theories supporting this framework include the human capital theory, which underscores the value of skills and knowledge in career development; the social cognitive career theory, which emphasizes personal agency and decision-making; and the method of RE and resiliency, which highlights adaptability and grit (GT). The three main components of the framework are determinants of employability, challenges, and indicators of success. Determinants of employability include program learning

outcome (PLO) attainment, academic performance, learning experiences (LE), and emotional intelligence.

Graduate faces challenges such as job demand mismatches, skills gaps, and the effects of the COVID-19 pandemic on the job market. Career success and employability are determined by how well graduates adapt to external economic, social, political, and technical factors while leveraging internal strengths.

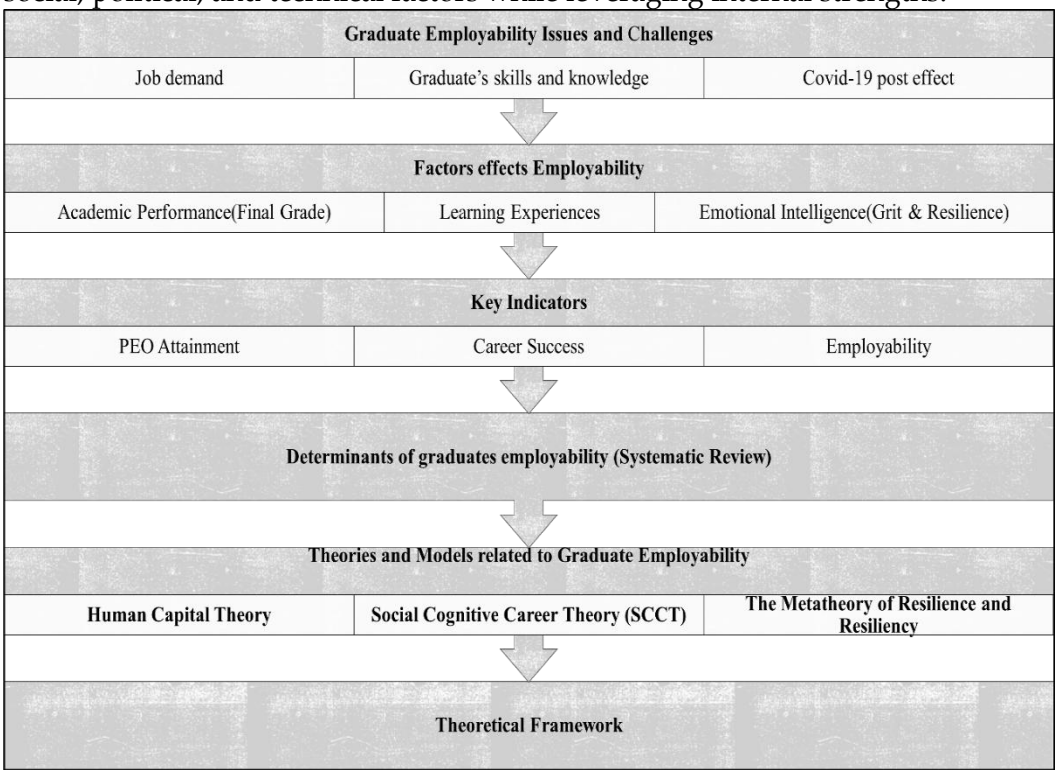

Figure 3: The research framework

3. Methods

3.1 Research Design

The data collection and analysis are directed by the design of the research, which functions as a study's outline. This study used an exploratory sequential mixed-method approach to integrate both qualitative and quantitative methodologies for the design of the tool. As depicted in Figure 4, the quantitative section used a structured online survey to acquire measurable data concerning levels of GT and RE that graduates have regarding PLOs and professional success. The qualitative component utilized open-ended structured interviews to explore the experiences of individuals with GT and RE. Using this mixed-methods approach allowed for a more in-depth understanding of the research areas, not merely by validating the study but also by attributing it to its other purposefulness. The qualitative aspect consisted of interviews applied to detailed examinations of the experiences engaged by participants, providing an in-depth understanding of GT and RE (Huyler & McGill, 2019); this combination enhances the strength and credibility of the research.

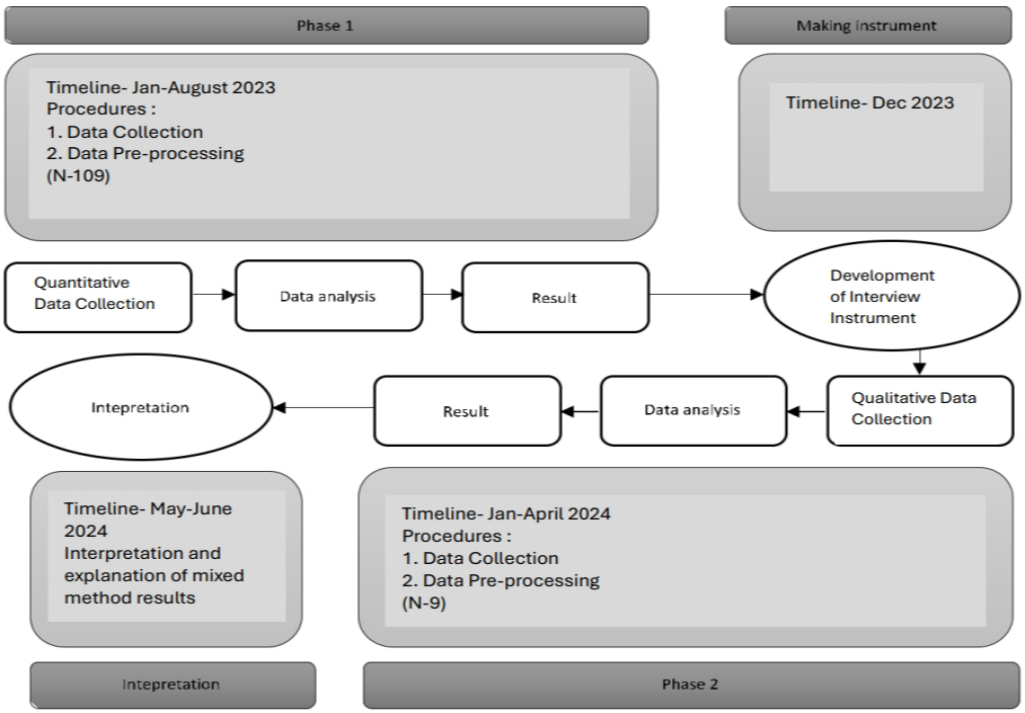

Figure 4: Exploratory sequential mixed-method research design

3.2 Hypotheses Development

The hypothesis was developed based on the assumption that GT and RE significantly influence career success, such as employment status, job satisfaction, and career progression, with PLO attainment serving as the mediator factor.

3.2.1 Grit and Resilience (Independent Variables)

According to Duckworth et al. (2007a), the grit scale measures tenacity and passion for long-term objectives. The Connor-Davidson resilience scale is used to measure RE, which is the capacity to overcome adversity constructively (Connor & Davidson, 2003). Their research demonstrated the validity and reliability of these measures in assessing RE and GT, respectively.

3.2.2 Program Learning Outcome Attainment (Mediating Variable)

The Program Learning Outcome (PLO) accomplishment is a measure of a graduate's success in achieving the learning objectives and skill levels specified by the computing program. The notion that PLOs contribute to graduates' overall achievement is supported by earlier research on educational outcomes conducted (Magolda & Astin, 1993).

3.2.3 Employment and Career Success (Dependent Variables)

Studies conducted by Ng et al. (2005) explored the factors influencing employment outcomes and career success, providing a foundation for understanding variables such as employment status, job satisfaction, salary levels, career advancement, promotions, leadership roles, etc.

3.2.4 Hypothesized Relationships

H1: Grit positively influences graduates' career success, including salary growth and promotions. Previous research by Eskreis-Winkler et al. (2014) suggested that GT positively impacts career success.

H2: There is a positive association between GT and the attainment of PLOs among graduates, indicating that higher levels of GT contribute better to mastery of the intended program outcomes. According to Duckworth et al. (2007a), GT positively predicts academic achievement, supporting the hypothesis that GT influences PLO attainment.

H3: Learning experiences positively influence career success among graduates. A study by Pianda et al. (2024) revealed that internship experience is very important in achieving multidimensional employability improvement in supporting the reduction of the unemployment rate.

H4: A graduate's LE positively affect their attainment of PLOs, indicating that immersive and effective LE contribute to better mastery of the intended program outcomes. A study by Thabassum et al. (2022) demonstrated that active and experiential learning strategies significantly enhance student's achievement of learning outcomes.

H5: There is a positive relationship between the level of RE and career success among graduates, including factors such as salary growth and promotions. Previous research by Eskreis-Winkler et al. (2014) suggested that GT and RE positively impact career success.

H6: There is a positive relationship between the level of RE and the attainment of PLOs among graduates. A recent study by Otaki et al. (2025) found that the role of RE is pivotal for academic achievement, enhances students' adaptability during educational transitions and contributes to the successful attainment of learning outcomes.

H7: Learning experiences positively influence GT level among graduates. A study by Yau and Shu (2023) investigated the relationship between GT and student engagement in higher education and confirmed that students with higher levels of GT were more engaged in learning.

H8: Learning experiences positively influence RE level among graduates. Chuang and Huang (2025) explored the impact of a life education program on students' psychological RE.

Figure 5 presents the model built on the hypothesis that GT and RE significantly influence career success, such as employment status, job satisfaction, and career progression, with PLO attainment as the mediating factor. It hypothesizes that individuals with higher levels of GT and RE are more likely to achieve their program's learning objectives, which in turn enhances their employability and career success.

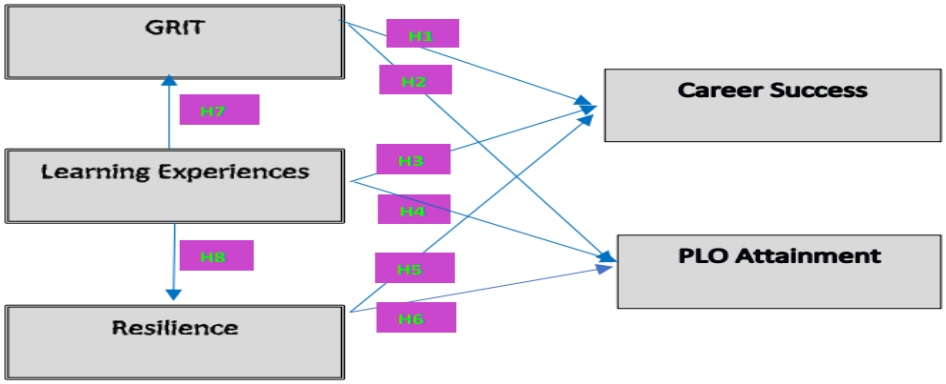

Figure 5: Research model

3.3 Participants and Data Collections

The data collection process took place over a span of ten months, beginning in January and ending at the end of October 2023. Prior to distributing the final version of the questionnaire, a pilot test was carried out to ensure that the instrument met acceptable standards of face validity, reliability, and overall quality. This preliminary phase was essential for confirming the consistency and clarity of the questionnaire before administering it to the target population. The participants involved in this study were alumni who graduated between 2015 and 2020. Of the 700 questionnaires distributed, a total of 115 responses were collected. However, six responses were excluded from analysis due to incomplete information.

A deterministic sampling process was used to ensure that the participants had experienced the situation being studied. The online survey included validated scales measuring GT and RE to gather quantitative data. Additionally, open-ended interviews were used to gather qualitative data on how participants experience GT and RE and their importance in their career success journey. The interviews were conducted from May to June 2024. A total of 20 participants were selected based on the criteria. This mixed-method approach allowed the complexity of individual experiences to be combined with broader quantitative trends, which supports a nuanced interrogation of the research aims.

A sample-to-variable ratio was used by the researcher for the quantitative investigation (Memon et al., 2020). A sample size is determined by dividing the total number of items by the sample-to-item ratio, which is typically advised for exploratory factor analysis. At least a 5-to-1 ratio is required. The sample -to variable ratio suggests a ratio of at least 5:1 between the variables and the observations. The total number of variables was five (GT, RE, career satisfaction, PLO, and LE). The 15:1 ratio preferred with the minimum number of samples was 75. The number of samples for this study was 109, exceeding the minimum number required.

For the qualitative study, several interviewees from the total survey responses were selected and invited to participate in the investigation of their career success stories. The selection of participants was based on the recommendation by Creswell and Poth (2016), with factors to consider when determining non-

probabilistic sample sizes for phenomenological study and grounded theory study. The selection criteria for the interviewees were based on graduates' salary earned, job satisfaction, and employment mode. The median monthly wages were selected according to Indeed and statistical analysis, and reports by the Department of Statistics Malaysia (2021).

3.4 Use of AI Tools

To improve the clarity and readability of this manuscript, the author(s) utilized ChatGPT, an artificial intelligence language model developed by OpenAI. This tool was employed solely for language refinement and enhancing the explanation of concepts. The use of ChatGPT did not influence research design, data collection, analysis, or interpretation. All intellectual content and research decisions remained the sole responsibility of the author(s).

4. Data Analysis

The quantitative data collected through the survey were processed and analyzed using statistical tools, particularly the Statistical Package for the Social Sciences (SPSS) version 27. This software was chosen for its strong functionality and ease of use, especially in conducting descriptive statistics and assessing reliability, as noted by Rahman and Muktadir (2021). It is also user-friendly and well suited for exploratory research and theory development.

The analysis employed a range of statistical methods, including correlation analysis and structural equation modelling (PLS-SEM), to explore and assess the relationships among key variables. These advanced analyses were carried out using SmartPLS version 4.0. As highlighted by Hair (2009), the PLS-SEM approach is advantageous for evaluating complex models that incorporate multiple constructs, indicators, and structural relationships. Moreover, it does not require the data to meet strict distributional assumptions, making it particularly suitable for exploratory research and the early stages of theoretical model development.

4.1 Model Development

The evaluation of the research model involved two key components: the measurement model (also known as the outer model) and the structural model (inner model). To begin with, the measurement model was assessed by examining the reliability and validity of the items used to measure each construct. This process is aligned with the approach commonly referred to as confirmatory factor analysis, which is used to ensure that the indicators accurately reflect their respective latent variables. Following this, the structural model was analyzed through techniques similar to those used in multiple regression, enabling the examination of relationships between the constructs within the model.

4.2 Assessment of Measurement Model

The initial step in evaluating the measurement model involved assessing its validity and internal consistency reliability. Confirmatory factor analysis was used in the measurement (inner) model to analyze how well the observed variables represented their underlying constructs (Chin, 1998). According to Hair et al. (2013), a theoretical framework requires a thorough re-examination of the

measurement, grounded in well-established and relevant concepts related to information systems. To evaluate the reliability of the measurement model, both Cronbach's alpha and composite reliability were applied. The validity of the model was assessed by examining convergent and discriminant validity, which is discussed in more detail in the following sections.

4.3 Measurement of Reliability

Cronbach's α (CA) has historically been used to evaluate the data's internal consistency. It offers an estimate of reliability based on the inter-correlation between the indicators and correlations between the indices (Hair et al., 2021). Since CA has its limitations, another metric called composite reliability has been utilized to evaluate the reliability of internal consistency. According to Hair et al. (2013), a CA value of more than 0.6 is seen as acceptable, but a value greater than 0.8 is thought to be a stronger predictor of construct reliability (Nunnally, 1994).

The range of 0.6 to 0.9 is the permissible range for composite reliability, which was reported to be weak when the value was less than 0.6 (Hair, 2009). Strong internal reliability was demonstrated by the latent variables' CA, ranging from 0.855 to 0.901, composite reliability values, ranging from 0.892 to 0.985, and average variance extracted values, ranging from 0.528 to 0.860, as shown in Table 1. A model's acceptable level and ideal inner quality for exploratory research are indicated by values more than 0.70 (Hair et al., 2012).

Table 1: Construct validity and reliability overview

	Cronbach's Alpha	Composite Reliability (ρ_a)	Composite Reliability (ρ_c)	Average Variance Extracted
GT	0.914	0.970	0.926	0.686
LE	0.901	0.922	0.917	0.528
PLO	0.975	0.985	0.980	0.860
RS	0.855	0.892	0.892	0.581
ST	0.947	0.954	0.958	0.765

4.4 Measurement Model

An element of a path model that contains the indicators and their relationships with the constructs is also called the outer model in PLS-SEM (Hair et al., 2021). Figure 6 shows the structural equation model derived from the analysis.

4.5 Reflective Measurement Model

This type of measurement model is structured such that the observed indicators are viewed as outcomes or manifestations of an underlying latent construction. In this framework, the direction of causality flows from the construction to its respective indicators. In the context of PLS-SEM, this model configuration is also known as Mode A (Hair et al., 2021).

The evaluation of a reflective measurement model involves several key criteria:

i) Composite reliability (CR), which assesses the internal consistency of the construction,
ii) Outer loadings, used to determine the reliability of individual indicators, and
iii) Average variance extracted, which measures convergent validity and discriminant validity is assessed using multiple methods including the Fornell-Larcker criterion, analysis of cross-loadings, and the heterotrait-monotrait ratio.

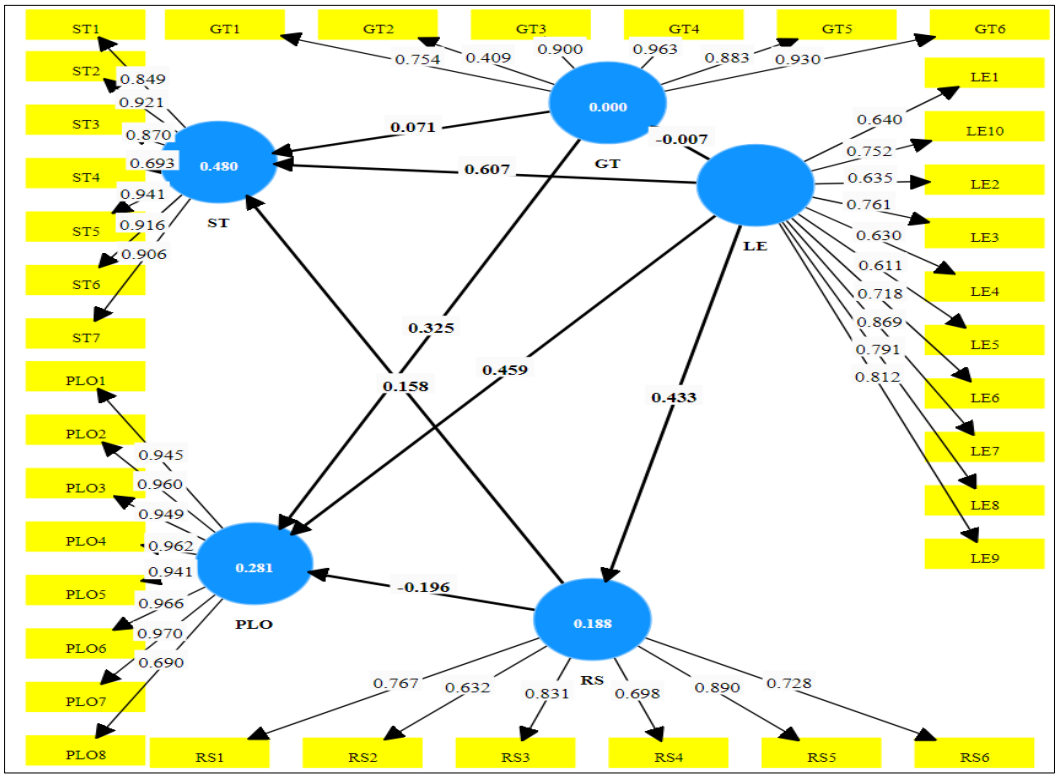

Figure 6: Structural equation model

4.6 Assessment of Structural Model

Estimating the linear relationships between independent (exogenous) and dependent (endogenous) latent variables is conducted after confirming the validity and reliability of the measurement (outer) model. To analyze the relationships among the constructs within the research framework, the structural model, also known as the path or inner model, was developed. The evaluation of this structural model aimed to verify whether the proposed hypotheses were supported by the empirical data collected in the study. The assessment of the structural model was based on the following key criteria:

1. Estimation of path coefficient (β) (hypothetical relations),
2. The coefficient of determination (R2),
3. Effect size (f2),
4. Predictive relevance (Q2), and
5. Goodness of fit (GOF).

For the evaluation of the path coefficients, the partial least squares (PLS) method was employed along with the bootstrapping technique using 500 resamples to estimate coefficient sizes and assess the statistical significance of the hypothesized paths. This approach generates T-statistics and P-values, which are critical for determining whether the relationships between latent variables are supported by the data. As shown in Table 2, eight hypothesized paths were tested within the model.

Table 2: Path coefficients

	Original sample (O)	Sample means (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P-values
GT -> PLO	0.325	0.301	0.180	1.810	0.070
GT -> ST	0.071	0.067	0.182	0.391	0.696
LE -> GT	-0.007	-0.023	0.221	0.031	0.975
LE -> PLO	0.459	0.455	0.197	2.334	0.020
LE -> RS	0.433	0.480	0.136	3.192	0.001
LE -> ST	0.607	0.618	0.106	5.750	0.000
RS -> PLO	-0.196	-0.192	0.165	1.185	0.236
RS -> ST	0.158	0.138	0.147	1.075	0.282

Of these eight paths, three showed statistically significant results at the conventional alpha level of 0.05. Specifically, the paths from the latent variable LE to PLO, RS, and ST had path coefficients of 0.459, 0.433, and 0.607 respectively, with corresponding T-values of 2.334, 3.192, and 5.750, and P-values of 0.020, 0.001, and less than 0.001. These findings indicate a significant positive effect of LE on these dependent constructs, highlighting its strong influence within the model.

Alternatively, five paths were found to be statistically insignificant. For example, the paths from GT to PLO and ST had coefficients of 0.325 and 0.071 with T-values of 1.810 and 0.391, and P-values of 0.070 and 0.696 respectively, which exceed the typical significance threshold. Similarly, the path from LE to GT was negligible and insignificant with a coefficient of -0.007 and a P-value of 0.975. Additionally, the relationships from RS to PLO and ST also lacked significance, with T-values of 1.185 and 1.075, and P-values above 0.2. These results suggest that these particular predictors do not have a statistically meaningful direct effect on their respective dependent variables in this study.

Overall, the results underscored the important role of LE in positively affecting several outcomes, while other latent variables, such as GT and RS, showed limited or no direct impact. This distinction helped understand the relative influence of each construct and may guide future refinement of the model or further research into possible mediating or moderating variables.

4.7 Moderation Results

This study proposed that LE act as a moderator in the relationships between several predictor variables: performance GT, RE, career satisfaction (ST), and PLOs. Moderation means that the strength or direction of the relationship between these variables may change depending on the level of LE.

To examine this, interaction effects were tested to determine whether LE significantly influence the impact of GT, RS, and ST on PLO.
Table 3 summarizes the moderation analysis results, showing the original sample estimates, standard deviations, T-statistics, P-values, and whether the hypothesized moderating effect was supported. The results indicate that LE significantly moderate the relationships involving RE, ST, and PLOs.

Table 3: Moderator results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	P-values	Comment
GT -> PLO	0.325	0.301	0.180	1.810	0.070	Not Supported
GT -> ST	0.071	0.067	0.182	0.391	0.696	Not Supported
LE -> GT	-0.007	-0.023	0.221	0.031	0.975	Not Supported
LE -> PLO	0.459	0.455	0.197	2.334	0.020	Supported
LE -> RS	0.433	0.480	0.136	3.192	0.001	Supported
LE -> ST	0.607	0.618	0.106	5.750	0.000	Supported
RS -> PLO	-0.196	-0.192	0.165	1.185	0.236	Not Supported
RS -> ST	0.158	0.138	0.147	1.075	0.282	Not Supported

Specifically, the moderating effect of LE on the path from LE to PLO was statistically significant, with a path coefficient of 0.459, a T-value of 2.334, and a P-value of 0.020. This suggests that LE positively influence how well performance outcomes are achieved, strengthening the relationship between the predictors and PLO. Similarly, the moderation paths from LE to RE and ST were also significant, with coefficients of 0.433 and 0.607, T-values of 3.192 and 5.750, and highly significant P-values of 0.001 and less than 0.001, respectively. These findings indicate that LE enhance the positive effects of RE and ST on the overall model outcomes.

In contrast, other hypothesized moderation effects involving PLOs' GT were not supported. For example, the moderation of LE on the relationship between GT and PLO showed a coefficient of 0.325 but was not statistically significant, with a T-value of 1.810 and a P-value of 0.070. Likewise, the moderation effect on GT to ST was also insignificant, with very low path coefficients and high P-values. Furthermore, the moderation path from LE to GT was near zero and not supported, indicating no moderating influence in this case.

Overall, these moderation results reveal that LE play an important role in amplifying the influence of certain factors, such as RE and ST, on PLOs.
However, LE do does not appear to moderate the effects of GT in this model significantly. This insight highlights the importance of fostering enriching LE to

enhance RE and ST for better performance outcomes, while suggesting that GT may function independently of such moderation.

4.8 Hypothesis Summary

To provide a clear overview of the structural model outcomes, Table 4 presents a summary of the hypothesis testing results based on the correlation analysis conducted in this study. Each hypothesis was evaluated to determine whether the proposed relationships between the latent variables were supported by the empirical data.

Table 4: Hypothesis results

Hypothesis	Statement	Result
H1	Graduates' career success, including pay increases and promotions, is positively impacted by GT.	Not Supported
H2	PLOs are positively correlated with GT.	Not Supported
H3	Graduates' career success is positively impacted by their LE.	Supported
H4	PLOs are positively impacted by a graduate's LE, suggesting that rich and successful learning environments improve program objectives mastery.	Supported
H5	Graduates' RE has a favorable correlation with career success.	Supported
H6	Graduates' achievement of PLOs is positively correlated with their level of RE.	Not Supported
H7	Graduates' level of GT is positively impacted by their LE.	Not Supported
H8	LE positively influences RE level among graduates.	Not Supported

The findings reveal that while some hypotheses were strongly supported, others were not confirmed. Hypotheses 3, 4, and 5 showed significant positive relationships, indicating that graduates' LE play a crucial role in enhancing both their career success and PLOs. These results suggest that engaging and effective learning environments help graduates achieve better mastery of program objectives and advance professionally. Additionally, RE was positively correlated with career success, highlighting its importance in contributing to graduates' achievements. In contrast, hypotheses 1, 2, 6, and 7 were not supported by the data. Specifically, GT did not show a significant positive impact on either career success or PLOs in this study.

Furthermore, LE did not significantly influence the level of GT, and RE was not significantly associated with PLO achievement. These findings imply that some personal traits may have less impact on graduate outcomes than initially expected, at least within the context of this sample. The results provide valuable insights into which factors most strongly influence graduate outcomes, with LE and RE emerging as key contributors. The unsupported hypotheses suggest the need for further research to explore additional variables that might mediate or moderate these relationships.

Based on these findings, the lack of support for some hypotheses may be attributed to external factors such as socioeconomic status. Most participants were from urban areas and came from families with strong economic backgrounds. These favorable conditions could have overshadowed the influence of personal traits such as GT and RE on career trajectory and success. Therefore, future research should consider including socioeconomic variables as potential moderators or control variables to better understand their impact on shaping graduate outcomes.

4.9 Qualitative Analysis

The hypothesis about the impact of GT and RE on computing graduates' employability and career success was not amply supported by the quantitative data analysis. Thus, the research project was expanded by employing open-ended structured interviews to gather qualitative data. A total of 24 graduates were chosen based on their employment style and income range. These alumni participated in an open-ended structured interview to learn more about their RE and GT. The nine participants' comments were recorded and examined to gain more insight into the occurrence.

4.9.1 Thematic Analysis

Thematic analysis (TA) is a widely used qualitative research method that involves identifying, analyzing, and interpreting patterns or "themes" within qualitative data. This approach helps researchers to organize and make sense of large volumes of textual data systematically by breaking it down into smaller, meaningful units called codes. These codes highlight interesting or significant features related to the research questions. By grouping these codes, broader themes emerge that reflect underlying concepts or patterns common across the data set. The themes serve as a way to represent the researcher's interpretations and provide a structured narrative to explain the data. Clarke and Braun (2017) offer a detailed six-step framework for conducting TA, which guides researchers from familiarizing themselves with data to produce a comprehensive report of the findings. This structured process ensures clarity and rigor in qualitative analysis.

4.9.2 Qualitative Analysis Result

The qualitative component of the study was based on 29 direct quotations obtained from participants. These quotes offered deeper insight into their personal experiences and professional development. The responses revealed how individuals react to challenges, recover from setbacks, and evolve in their careers. Through TA, a variety of recurring patterns emerged. Each of these is explored in the following sub-sections to highlight the unique and often complex paths that participants have taken in navigating their professional journeys.

4.9.2.1 Challenges and Setbacks

Many participants reported facing major obstacles, particularly during the early stages of their careers. These challenges often included managing tasks beyond their prior experience and coping with limited resources. Addressing such issues requires independent research, identifying relevant stakeholders, and showing persistence. When critical errors occurred, such as failures in capstone projects or service delivery, they often had to start over. Breaking down problems into

manageable parts, seeking guidance, and remaining resilient were all key strategies for overcoming difficulties.

4.9.2.2 Goal Setting and Achievement
The participants emphasized the importance of setting realistic goals and breaking them down into smaller, actionable steps. Progress tracking helped maintain motivation, while celebrating minor successes provided a sense of achievement. In many cases, social media and networking opened up unexpected opportunities. Continuous learning and personal development were viewed as ongoing necessities, regardless of job stability or career stage.

4.9.2.3 Discomfort and Uncertainty
The participants often had to step out of their comfort zones, whether in public speaking, solo travel, or accepting unfamiliar job roles. Strategies that helped them cope included preparation, a positive mindset, and the use of stress management techniques. Learning to adjust to new environments, whether social or professional, provided them with valuable life lessons and helped them build confidence to face future uncertainties.

4.9.2.4 Project Tracking
To manage demanding projects, participants adopted structured approaches that involved defining clear goals, breaking down tasks, setting timelines, and maintaining open communication with all stakeholders. This methodical process enabled them to handle overwhelming workloads more effectively and maintain focus throughout project implementation.

4.9.2.5 Criticism or Negative Feedback
The participants described criticism not as a setback but as an opportunity for improvement. Instead of reacting defensively, they used feedback to enhance their skills and performance. Many participants stressed the value of open communication and actively sought constructive criticism as part of their growth process.

4.9.2.6 Setbacks or Failures
When setbacks occurred, the participants often took time to pause and reflect. They analyzed what went wrong and considered what could be learned from the experience. This period of reflection, combined with logical thinking and emotional RE, helped them return to their tasks with renewed clarity and determination.

4.9.2.7 Stress or Pressure
To manage stress effectively, participants relied on techniques such as taking regular breaks, prioritizing workloads, and occasionally disconnecting from work-related tasks. Maintaining an organized approach to responsibilities and fostering a positive mindset were also seen as essential to coping with high-pressure situations.

4.9.2.8 Unexpected Changes or Challenges
The participants shared that sudden changes in their work or industry required flexibility and a willingness to learn new things. Staying curious and continually upskilling were important coping strategies. Engaging with industry professionals and mentors also provided helpful guidance and support during these periods of adjustment.

4.2.2.9 Resilience in Facing Obstacles
Resilience emerged as a recurring theme throughout the responses. Many participants developed it through patience, persistence, and a focus on solutions rather than problems. They reflected on their progress regularly, sought improvement through training, and overcame self-doubt by continuing to try despite challenges.

4.9.2.10 Impact of COVID-19
The pandemic had a mixed impact on the participants. While some were fortunate enough to find opportunities, others encountered job loss or delayed career progress. Nevertheless, many highlighted the emergence of remote work as a positive shift. They appreciated the flexibility and new prospects it offered in navigating their careers during uncertain times.

4.9.2.11 Survival or Successful Career Life
Participants who described their careers as successful credited this to a combination of continuous self-improvement, openness to new opportunities, and maintaining personal well-being. Rather than focusing solely on ambition, they highlighted the importance of work-life balance, self-awareness, and aligning career decisions with long-term satisfaction.

In conclusion, the qualitative findings underscore the importance of traits such as RE, adaptability, continuous learning, and effective stress management. These qualities enable individuals to handle the unpredictable nature of modern careers. The lived experiences shared by participants provide practical lessons for both current students and early-career professionals. The next section expands this discussion by examining how personal traits such as GT and RE further influence career growth and long-term professional success.

4.9.3 Grit and Resilience Among Graduates
To address the research objectives, the following research questions were sought.

RQ1: What are the factors that contribute to employment and career success among graduates?

Through literature analysis, the researcher found that GT, RE and LE are the most important factors that influence the career success of graduates. Through the survey, quantitative analysis, it is proven that LE positively influences career success among graduates.

RQ2: How do those factors influence career success indicators, such as job satisfaction, salary growth, and career advancement of graduates?

The main objective in using interviews was to collect a considerable amount of detailed information that could not be collected using a survey. Based on the TA, it is proven that GT and RE positively impact career success. Figure 7 shows the influence of G and RE among all the participants who are successful in their careers. The insight derived shows that GT is the most significant component reflected in the recorded responses. Resilience is another important component reflected.

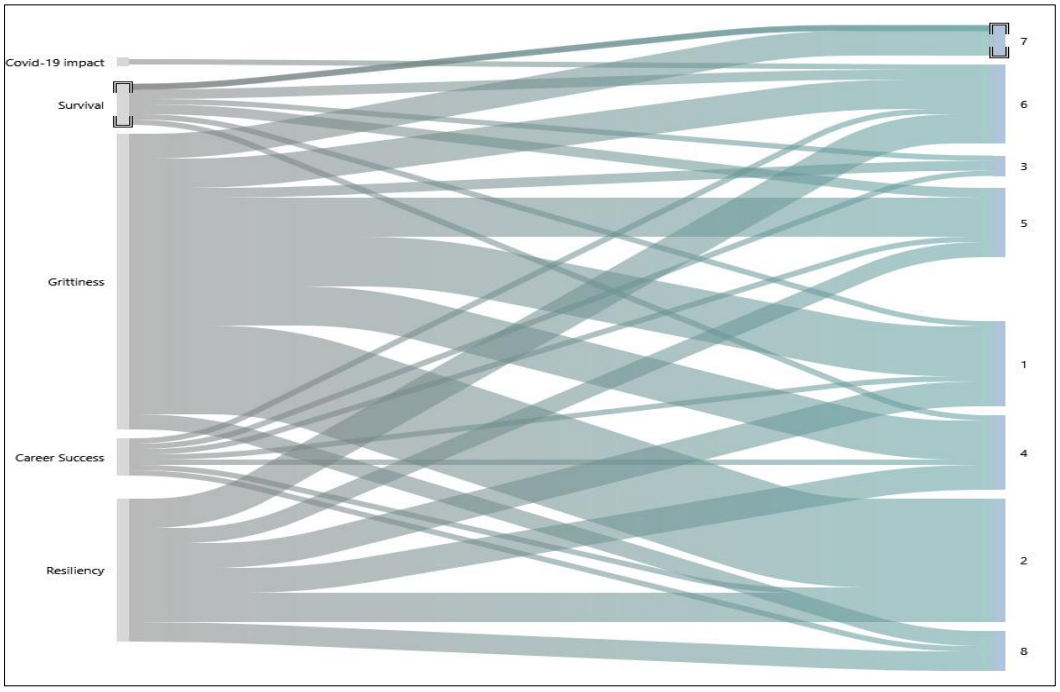

Figure 7: Sankey diagram from thematic analysis

5. Results

5.1 Summary and Interpretation of Hypothesis Results

H1: Graduates' career success, including pay increases and promotions, is positively impacted by GT. (Supported)
Interpretation: Grit (consistency of effort and perseverance) contributes to career success significantly influence measurable outcomes such as pay increases or promotions for these graduates.

H2: PLOs are positively correlated with GT. (Not Supported)
Interpretation: The lack of correlation here may suggest that while GT helps with sustained effort, it may not directly impact on the specific learning outcomes tied to program objectives. PLOs could be more influenced by other factors such as curriculum structure, quality of teaching, and engagement with relevant industry skills, such as Agile methodologies and IT tools.

H3: Graduates' career success is positively impacted by their LE. (Supported)
Interpretation: This result indicates that positive, enriching LE significantly contributes to graduates' career success. This suggests that interactive, industry-

aligned learning environments, internships, and hands-on Agile training provide graduates with skills and confidence that help them excel in their careers.

H4: PLOs are positively impacted by a graduate's LE, suggesting that rich and successful learning environments improve program objectives. (Supported)
Interpretation: The positive correlation implies that well-designed LE plays a crucial role in helping students meet program objectives. This could underscore the importance of practical, Agile-aligned curricula that prepare graduates with the necessary technical and problem-solving skills for the workforce.

H5: Graduates' RE has a favorable correlation with career success. (Supported)
Interpretation: Resilience, or the ability to adapt and bounce back from challenges, is shown to correlate positively with career success. This suggests that the capacity to handle setbacks is valuable in navigating career progression, likely reflecting the demands of the fast-paced IT industry in Klang Valley.

H6: Graduates' achievement of PLOs is positively correlated with their level of RE. (Not Supported)
Interpretation: Resilience may not directly affect the achievement of specific PLOs. This suggests that while RE is important for career success, academic outcomes may be more influenced by targeted skills and knowledge acquisition rather than the general ability to recover from setbacks.

H7: Graduates' level of GT is positively impacted by their LE. (Not Supported)
Interpretation: This finding suggests that positive LE may not necessarily increase a student's level of GT, as GT tends to be more of a personal characteristic. This implies that while supportive learning environments are beneficial, they may not directly impact a graduate's perseverance or consistency of effort.

H8: Graduates' level of RE is positively impacted by their LE. (Not Supported)
Interpretation: This outcome implies that RE, like GT, may not be directly influenced by LE. Resilience might be more closely tied to personal or life experiences outside of academic settings or possibly developed through other extracurricular activities or challenging life events.

The quantitative analysis results show inconsistency due to COVID-19 or post-pandemic factors and their impact on the computing graduate's employability and career success journey.

5.2 The Proposed Model

Figure 8 presents a comprehensive model that incorporates both internal and external factors contributing to a graduate's career success. The external factors include economic, social, political, and technical influences, which constitute the broader environment shaping the professional landscape in which graduates operate. These elements are positioned around the outer boundary of the model to signify their pervasive impact on graduate outcomes.
Within this environment, the internal success factors comprise Academic Performance, LE, and Emotional Intelligence, particularly the attributes of GT and

RE. These internal elements are enclosed within an Agile and Adaptive Layer, emphasizing the importance of flexibility and responsiveness to evolving challenges such as the COVID-19 pandemic and Climate-related disruptions.

At the center of the model lies the graduate's career success, which is directly influenced by internal factors. academic performance and LE contribute to the attainment of PLOs. Career success is shaped by academic achievement, emotional intelligence, and experiential learning. Emotional intelligence, in particular, plays a moderating role in this relationship. Graduates with higher levels of GT and RE are more likely to convert their LE into substantial career accomplishments.

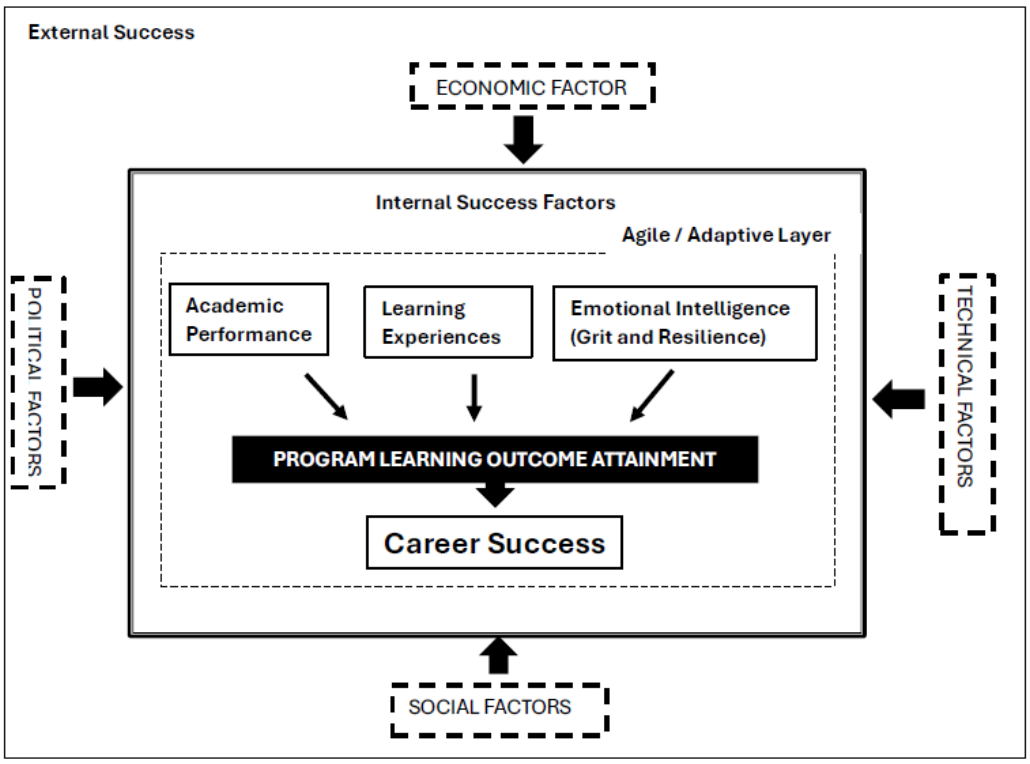

Figure 8: The agile career success model

The attainment of PLOs and the achievement of career success together form the foundation of graduate employability. Employability is supported by a combination of academic skills, personal attributes, and adaptability to external environmental factors. The model ultimately highlights the need for a balanced integration of internal capabilities and contextual awareness to ensure sustained success in an increasingly competitive and dynamic professional landscape.

5.3 Comparison with Existing Literature

The findings support GT as a strong positive predictor of career success in graduates, in terms of both salary progression and career progression. This result is consistent with the theoretical argument that GT—effort and passion for long-term goals (Duckworth et al., 2007)—is an important psychological resource for coping with setbacks in early career and for persisting in high-stake work

contexts. Their result is consistent with previous findings by Eskreis-Winkler et al. (2014) who demonstrated that GT predicts success in the long-run in career and academic contexts, more than IQ and talent. In the Malaysian context, this finding is consistent with Yau and Shu (2023) which highlighted the line of positivity role of GT in student's engagement and goal pursuit under stress and disruption as evident in the COVID-19 outbreak.

The results provide support for H5: there was a statistically significant positive relationship between RE and career success for computing graduates. This is supported by existing evidence, such as Chuang and Huang, (2025) who observed increased confidence and flexibility among nursing students when exposed to RE-building programs, reflecting a comparably higher professional readiness. Similarly, (Otaki et al., 2025) reported that students who were exposed to interventions aimed at building their RE were also better equipped to deal with career uncertainty, a competence particularly appropriate in today's post-pandemic world.

5.4 Methodological Contribution

The research utilized an exploratory sequential mixed-methods approach, which evaluated the hypothesized relationships among constructs, including LE, GT and RE, and outcomes as graduates, with an initial, quantitative phase to measure these variables, Second, a qualitative phase was added to investigate the statistical results in a more detailed manner.

At a quantitative level, strong relationships were also unveiled, namely the effects of GT and RE on career success and the mediation of these personal resources between LE and employability in the job market. Nevertheless, not all the hypotheses were supported, and some pathways were weaker than expected. To delve into these results, a subset of graduating students was interviewed qualitatively to make sense of the "why" behind the numbers and deepen the contextual information.

The qualitative results helped to explain and nuance the model in three key aspects. They began by replicating the quantitative findings and stressing the importance of GT and RE in the development of one's career amid the aftermath of COVID-19. Second, interviewees helped unpack the results that presented an unclear or weaker picture in the statistical analysis; for instance, while quantitative data showed a slight relationship between LE and RE, the interviewees explained that perhaps this was because teaching quality was highly variable, structured support was lacking, and learning environments were passive. Third, the qualitative phase revealed new and unmeasured themes, e.g., the role of peer support, cultural norms, and the perceived value of computing degrees, which indicate opportunities for enhanced model development and future research.

This synthesis of findings is meant to be complementary such that the quantitative findings are broadly confirmatory and generalizable, while the qualitative narratives deepen understanding by adding lived experience, context, and

mechanisms of action. These combined contributions enhance the soundness and generalizability of the agile career success model in the context of Malaysian computing education.

6. Discussion

6.1 Employment Outcomes

The study found that LE positively influences graduates' employability and career success. For instance, graduates' participation in extracurricular activities, social networking, community services, professional membership, internship, capstone projects, alumni events, employer projects, and guest lectures often determine the employability and career success of graduates beyond their academic achievements. Graduates who engaged in ongoing learning and skill enhancement reported higher job satisfaction and faster career progression.

6.2 Program Learning Outcome Attainment

The PLOs are positively impacted by a graduate's LE, suggesting that rich and successful learning environments improve program objectives. The study also suggested mechanisms for curricular alignment with industry needs and taught insights to enhance graduates' employability in tertiary education. Graduates from these programs integrate technical abilities with practical industry expertise, resulting in a cohort of more confident and employment-ready professionals. The LE of graduates make it easy for them to achieve the PLOs.

6.3 Resilience and Career Outcomes

The resilience level garnered a positive relationship with career success among graduates, measured by salary, career advancement opportunity, and recognition, as well as job quality (work environment, work-life balance, and job security). The theme analysis reveals the most significant resiliency attributes from graduates in supporting success in the career journey of all graduates. The study reveals the importance of patience, perseverance, and self-reflection in overcoming challenges. It highlights the importance of taking breaks, prioritizing tasks, and assessing the impact of obstacles.

6.4 Grit and Career Success

Grit and career success is concluded after the qualitative analysis, based on which GT also helps graduates climb the career ladder, improve salaries, and have higher job satisfaction. Most of the interviewees flexed their GT in their answers. This is why they achieved success in their career journey as fresh graduates; hence, the GT attribute plays a major part. The study revealed the importance of managing time, improvising, and seeking advice. It emphasizes the importance of breaking down problems into smaller tasks, perseverance, and teamwork. A journey is marked by facing challenges, managing stress, and maintaining focus. The importance of seeking feedback from managers and colleagues, maintaining a structured timeline, and developing advanced project management skills were highlighted.

6.5 Implications for Education Providers

According to the results, significant strategies are suggested for educational institutions to increase curriculum relevancy and employability skills.

6.5.1 Curriculum Enhancement

Industry-led skills and knowledge should be integrated in the curriculum. This means upgrading or updating course material to be able to deliver the curriculum in line with current market demands and technological advancements. The addition of modules such as digital literacy and emerging technologies should be encouraged to help graduates better prepare for an ever-changing job landscape.

6.5.2 Soft Skills Development

Roll out programs and workshops that focus on soft skills such as communication, teamwork, etc. incorporate exercises that can inculcate GT and resilient traits amongst the graduates. Employers greatly value these abilities, and they are crucial to getting ahead in careers.

6.5.2.1 Internship Programs

Industry partnerships may be developed for more internships, ensuring that these are field-related and provide solid work experience. An internship is the period when graduates reinforce knowledge and practical experience that aids their journey in their career life.

6.5.2.2 Sustained Feedback Mechanisms

Employers and alumni may develop mechanisms for regular feedback to improve curriculum and pedagogy. This feedback can be collected using surveys and focus groups. Further, the feedback from graduates or alumni also helps assess where they are in their academic and career journey, bridging the education-employment gap.

6.6 Implications for Policy Makers

The role of policymakers will be vital to bridge the education-employment gap. This implies policy interventions as follows:

6.6.1 Industry Education Collaboration

Education and industry sectors should enhance coordination between the more effective curriculum orientation to the job market. This might mean creating industry advisory boards for academic programs. This can only be achieved if education providers work in tandem with the industries to ensure that graduates get a timely opportunity for hands-on experience in their respective fields. This will give more confidence to the graduates and help them survive better in their career journey.

6.6.2 Funding and Support

Invest in programs that increase employability, e.g., vocational training and lifelong learning initiatives, by providing funding & resources. A generous scholarship or grant program for training programs and skill-based development could entice graduates into additional work.

6.6.2.1 Employment Initiatives
Promote programs that help young people get jobs, such as career counselling services placement, and mentorship. Incentivizing hiring graduates of college/vocational, and even primary education, may also help. Promotion of regular industry professional guest lectures and seminars for students to relate to real-world issues and processes.

6.6.2.2 Monitoring and Evaluation
Educational initiatives may be tracked and evaluated to determine how well they are meeting labor market demands. Program relevance may be attempted through periodic assessments and changes in response to labor market data. Longitudinal training programs may be instituted to stay relevant through lifelong learning, which enables graduates to continue mastering the latest skills to keep up with workforce change.

6.7 Advice for Employers
The following strategies could also be implemented by employees to provide graduates with a supportive entryway into the workforce.

6.7.1 Recruitment Practices
Employers may recruit graduates with academic qualifications and the appropriate soft skills. Employers may use assessment centers to assess competencies in totality. In practice, tests and team exercises are used when hiring a graduate.

6.7.2 Talent Development
Employers may invest in preceptorship training and continuing professional development to support graduates in the initial years' skills, personalized transition programs, and career progression; encourage mentorships and life-long learning, such as leadership development programs or technical skills workshops.

6.7.3 Internship and Apprenticeship Programs
Internship and apprenticeship courses may be organized to offer hands-on learning targeted at the skills. Employers may ensure proper oversight in line with the objectives of the firm. Rotational programs can also be effective (for example, these expose interns to multiple departments). Greater engagement between academia and industry may be encouraged to enable richer internships and experiential learning opportunities for students.

6.7.4 Feedback and Engagement
Employers may keep lines of communication with colleges and universities open, provide feedback on the performance of graduates, and suggest changes to curricula. Relationships can be created through regular meetings and collaborative projects with teams.

6.8 Novelty and Contributions
This study has offered several novel contributions to the existing literature on graduate employability and career success. Whilst past research has focused on technical skills or academic performance in the context of employability, in this

study GT and RE were highlighted as two psychological characteristics that are neglected in employability research and are introduced as catalysts of career success. The quality-of-life analysis finds that these personality characteristics do impact on job satisfaction, career prospects, and flexibility in the work force.

The proposal of the agile career success model is an important theoretical development. Contrary to static models of employability, the agile model captures internal qualities and external enablers (internal qualities: persistence; lifelong learning; motivation, external enablers: a curriculum relevant to the needs of industry; internships; policy support) to provide a dynamic and future-oriented picture of graduate success.

7. Conclusion, Limitations, and Future Directions

7.1 Conclusions

The research revealed the impact of immersive LE, industry-relevant curriculum, and RE on aligning transitions to employment for graduates. It is through this alignment with industry needs, the cultivation of soft skills, and the development of a lifelong learning mentality that higher education institutions can begin to prepare their graduates better. Collaboration among academia, industry, and policymakers bridge the education-employment gap for better career outcomes for graduates.

This alone should make the findings especially interesting to policymakers because implementing them can help increase a more skilled and adaptable workforce, which is ultimately beneficial for the overall economy and society. An agile career success model proposed (Figure 8) consists of external factors and internal factors that contribute to the employability and career success of graduates. The agile model developed should be capable enough to handle unforeseen changes if they occur in the future.

7.2 Limitations

While this study provides important insight, it also has some significant limitations. The research is constrained to Klang Valley in Malaysia; therefore, the applicability of findings may differ among regions with different economic contexts and cultures, as well as education levels. This is cross-sectional data as it examines the individual at the earliest point in our study. Future research should ideally adopt a longitudinal approach to investigate the long-term consequences of diverse factors that may contribute to or hinder career success and employability.

Tracking participants over multiple stages of their life, allows a better understanding of the evolving influence of personal traits and learning environments on career success and employability. Future studies should also incorporate sample data nationwide to capture more diverse and representative input. Since the findings are based on self-reported data from graduates, there is a potential bias present because participants may have overstated their skills and experiences.

The study on socio-economic technologies' impact on employment outcomes and career success has significant implications for the United Nations Sustainable Development Goals, particularly SDG8, which aims to promote inclusive and sustainable economic growth, employment, and decent work for all. Understanding the intersection between socio-economic technologies and other factors such as education, socioeconomic status, and geography are crucial for achieving this goal. Critical examination of these interactions can inform policies for equitable access to career development opportunities, aligning with SDG8. Future research should address the importance of a more holistic lens for addressing access to inclusive employment outcomes worldwide.

7.3 Future Works

Future research could explore and address the limitations of the current study by adopting different research methodologies or conducting longitudinal studies. Since this study was located, the observed phenomena may be influenced by specific regional factors, which limit the generalizability of the findings to other settings.

Expanding the scope to include multiple locations would provide a more comprehensive understanding of graduate employability and career success across diverse contexts. This broader approach would enable the development of more precise and practical interventions tailored to varying local conditions.

Due to time constraints, longitudinal design was not feasible in this study. However, implementing longitudinal research would offer valuable insights into how variables evolve over time and clarify cause-and-effect relationships that cross-sectional studies cannot capture. Such research is essential to grasp how motivation and external pressures related to sustainable practices influence employer expectations and potentially redefine what constitutes a successful employee.

To further enhance the applicability of future findings, it is recommended that research samples be diversified to include graduates from various regions across Malaysia, such as the East Coast states, Sabah and Sarawak. This inclusion would capture a wider array of socioeconomic backgrounds and cultural influences, providing richer data and a more nuanced understanding of the factors shaping graduate outcomes nationwide. To facilitate better integration in the future, mixed methods studies could use a more concurrent or iterative design, in which qualitative data directly drives item revision to the quantitative measure or explains unexpected statistical results.

8. References

Asada, H., Nixon, S., & Koen, V. (2017). *Boosting productivity in Malaysia.* Organization for Economic Co-operation and Development. https://doi.org/10.1787/e8985a5b-en

Becker, G. S. (1964). *Human Capital*. National Bureau of Economic Research. https://www.nber.org/books-and-chapters/human-capital-theoretical-and-empirical-analysis-special-reference-education-first-edition

Bikar, S. S., Talin, R., Rathakrishnan, B., Sharif, S., Nazarudin, M. N., & Rabe, Z. Bin. (2023). Sustainability of Graduate Employability in the Post-COVID-19 Era: Initiatives by the Malaysian Ministry of Higher Education and Universities. *Sustainability (Switzerland)*, *15*(18). https://doi.org/10.3390/su151813536

Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. *MIS quarterly*, vii–xvi. https://www.jstor.org/stable/i211420

Chuang, Y. M., & Huang, W. H. (2025). Exploring the impact of a life education program on the resilience of nursing students. *PLoS ONE*, *20*(4 April). https://doi.org/10.1371/journal.pone.0322793

Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, *12*(3), 297–298. https://doi.org/10.1080/17439760.2016.1262613

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82. https://doi.org/10.1002/da.10113

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Department of Statistics Malaysia. (2021). *Department of Statistics Malaysia Official Portal*. https://www.dosm.gov.my/

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007a). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Eskreis-Winkler, L., Shulman, E. P., Beal, S. A., & Duckworth, A. L. (2014). The grit effect: predicting retention in the military, the workplace, school and marriage. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.00036

Hair, J. F. (2009). *Multivariate data analysis*. Pearsons.

Hair, J. F., Anderson, R., Babin, B., & Black, W. (2013). *Multivariate Data Analysis Pearson New International Edition*. Pearson Deutschland. https://elibrary.pearson.de/book/99.150005/9781292035116

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 414–433. https://doi.org/10.1007/s11747-011-0261-6

Hair J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature.

Huyler, D., & McGill, C. M. (2019). Book Review: Research Design: Qualitative, Quantitative, and Mixed Methods Approaches by Creswell, John and Creswell, J. David. *New Horizons in Adult Education and Human Resource Development*, *31*(3), 75–77. https://doi.org/10.1002/nha3.20258

Kamaruddin, M. I. H., Ahmad, A., Husain, M. A., & Hamid, S. N. A. (2023). Employment Trends of COVID-19 Graduates: The Case of a Malaysian Public University. *International Journal of Academic Research in Progressive Education and Development*, *12*(2). https://doi.org/10.6007/ijarped/v12-i2/17240

Kaur, S. (2016). Employment trends and job satisfaction in Malaysia: A review of literature. *International Journal of Academic Research in Business and Social Sciences*, *6*(10), 263–276.

Magolda, M. B. B., & Astin, A. W. (1993). What "Doesn't" Matter in College? *Educational Researcher*, *22*(8), 32. https://doi.org/10.2307/1176821

Malaysian Qualifications Agency. (2017). *Malaysian Qualifications Agency*. https://www.mqa.gov.my/

Memon, M. A., Ting, H., Cheah, J.-H., Thurasamy, R., Chuah, F., & Cham, T. H. (2020). Sample Size for Survey Research: Review and Recommendations. *Journal of*

Applied Structural Equation Modeling, *4*(2), i–xx. https://doi.org/10.47263/JASEM.4(2)01

Misni, F., Mahmood, N. H. N., & Jamil, R. (2020). The effect of curriculum design on the employability competency of Malaysian graduates. *Management Science Letters*, *10*(4), 909–914. https://doi.org/10.5267/j.msl.2019.10.005

Mok, S. (2016). The role of human capital in economic growth: A comparative study of Malaysia and the Philippines. *International Journal of Academic Research in Business and Social Sciences*, *1*(1), 15–26.

Mukuni, J. (2023). Behold the Fourth Industrial Revolution and How to Keep Pace with Workplace Competencies in an Ever-Changing World of Work! In H. El-Farr (Ed.), *The Changing Landscape of Workplace and Workforce*. IntechOpen. https://doi.org/10.5772/intechopen.1002648

Ng, T. W. H., Eby, L. T., Sorensen, K. L., & Feldman, D. C. (2005). Predictors of Objective and Subjective Career Success: A Meta-Analysis. *Personnel Psychology*, *58*(2), 367–408. https://doi.org/10.1111/j.1744-6570.2005.00515.x

Nunnally, J. C. (1994). *Psychometric Theory 3E*. Tata McGraw-Hill Education. https://books.google.com.my/books?id=_6R_f3G58JsC

Otaki, F., Ho, S. B., Nair, B., AlGurg, R., Stanley, A., Khamis, A. H., Paulus, A., & Alsuwaidi, L. (2025). Effects of building resilience skills among undergraduate medical students in a multi-cultural, multi-ethnic setting in the United Arab Emirates: A convergent mixed methods study. *PloS One*, *20*(2), e0308774. https://doi.org/10.1371/journal.pone.0308774

Pianda, D., Hilmiana, H., Widianto, S., & Sartika, D. (2024). The impact of internship experience on the employability of vocational students: a bibliometric and systematic review. *Cogent Business and Management*, 11(1). https://doi.org/10.1080/23311975.2024.2386465

Rahman, A., & Muktadir, Md. G. (2021). SPSS: An Imperative Quantitative Data Analysis Tool for Social Science Research. *International Journal of Research and Innovation in Social Science*, *05*(10), 300–302. https://doi.org/10.47772/ijriss.2021.51012

Rahman, H. A. (2018). Climate change scenarios in Malaysia: Engaging the public. *International Journal of Malay-Nusantara Studies*, *1*(2), 55–77.

Rahman, N. H. A., Ismail, S., Ridzuan, A. R., & Samad, K. A. (2020). The Issue of Graduate Unemployment in Malaysia: Post Covid-19. *International Journal of Academic Research in Business and Social Sciences*, *10*(10). https://doi.org/10.6007/ijarbss/v10-i10/7843

Ramasamy, R. (2014). Labor market outcomes of tertiary education: A Malaysian perspective. *Eurasian Journal of Business and Economics*, *7*(14), 147–160.

Thabassum, M. S. A., Thaha, M. M., Rajendran, N., Abudhahir, A., & Rahman, B. S. A. (2022). Enhancing Attainment of Learning Outcomes Through Active Learning. In *Journal of Engineering Education Transformations* (Vol. 36).

World Bank. (2022, June). *Malaysia Economic Monitor: Catching Up Inclusive Recovery Growth for Lagging States*. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099545006092216616

Yau, O. K. T., & Shu, T. M. (2023). Why are students with a higher level of grit more engaging in learning? The mediation effect of negotiable fate on the grit-student engagement relationship in higher education during COVID-19. *Journal of Pacific Rim Psychology*, *17*. https://doi.org/10.1177/18344909231171728

Yun, W. S., & Beh, C. Y. (2024). Malaysian Graduates Employability in Post Covid-19: A Swot Analysis. *Journal of International Business, Economics and Entrepreneurship*, *9*(2), 29–40. https://doi.org/10.24191//jibe.v9i1.102

Appendix 1

SKEWNESS AND KURTOSIS

	Mean	Median	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness
Grit	0.000	-0.062	-2.955	2.263	1.000	1.887	-0.412
LearnExp	-0.000	0.059	-1.864	1.692	1.000	-0.813	-0.132
PLO	0.000	0.303	-1.951	1.553	1.000	-0.850	-0.126
Resilience	0.000	-0.276	-1.656	2.485	1.000	-0.001	0.651
Satis	0.000	0.040	-1.830	1.504	1.000	-0.986	-0.288