Strategies in Developing Graduate Employability Skills: An Investigation on a TVET Programme in a Malaysian Public University

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Abstract: This paper brings to light the importance of Technical and Vocational Education and Training (TVET) graduates' graduate employability (GE) skills development through practical, hands-on and industry-involved activities. It does so by first identifying the current GE development strategies employed in a selected TVET programme of a public university in Malaysia. The investigation looked at the in-class and out-of-class activities as well as the industry involvement as a concerted effort towards developing the TVET students' GE skills of a selected programme in a public university in Malaysia. Based on a quantitative research design, a set of questionnaires was administered online to the target samples comprising 169 final year students. The questionnaire was adapted from previous studies and reports namely, Schwarzer and Jerusalem (1995), Bass and Avolio (1996), United States Department of Education (2010) and WEF (2023). A pilot study was conducted to confirm the Cronbach Alpha value of the adapted questionnaire before proceeding to the actual data collection. Instrument validity was established through a panel of experts' review. The data was analysed descriptively using SPSS version 25. Frequency counts, mean scores and regression analysis provided a basis for the salient findings which were discussed and interpreted based on relevant literature review. It was discovered that much more could be done to the existing teaching and learning practices especially on the activities that could be conducted in and out of the classroom and ones that involve the industries. Specifically, strategies need to be employed within the TVET programme to facilitate the GE skills development through heavy practical, hands-on and industry-involved activities as suggested by the salient findings of the present study. The regression analysis further confirms the strong need for the real-world contexts and industry involvement in the programmes. Lecturers, curriculum designers, policymakers and the higher education institutions' top management could find the findings and proposed interpretations from the present study relevant especially during the curriculum review of the programme.

Keywords: Graduate employability (GE), GE skills development, Teaching and learning strategies, TVET

1. Introduction

With the current emphasis on the Technical and Vocational Education and Training (TVET) sector in Malaysia which has received attention from the government through the allocation of government fund for TVET training and competency building, there is a sense of pressure for higher

education institutions offering TVET programmes to improve their employability rates (Lee, 2020). The emphasis on TVET initiated by the Malaysian Ministry of Higher Education (MOHE) has since been echoed by other government agencies such as TalentCorp and MDEC, and the Ministries such as the Ministry of Economy, the Ministry of Investment, Trade and Industry, and the Ministry of Youth and Sports. Big industries comprising multinational companies such as ExxonMobil, Shell and Petronas have all participated in a concerted effort towards developing TVET graduates' employability skills through special projects such as high-end internship programmes, coaching and mentoring as well as management trainee programmes. The collaborative effort is driven by the ongoing smart and strategic partnership with industries in Malaysia as the demand for a labour market supplied with skilled graduates becomes more and more obvious (Aqli, Hasan & Sucita, 2019).

In general, TVET programmes aim to fulfil the need for skilled graduates in terms of technical, soft and hard skills that depict the graduates' employability skills. However, despite the growing emphasis on graduates' employability skills development, there is still a concern among the industries on the graduates' quality as they enter the workforce, especially in terms of the soft skills development. According to Chen, Shen and Gosling (2018), employers often find flaws with graduates struggling to secure employment due to the lack of communication, adaptability, critical thinking and other soft skills. Hence, this paper intends to investigate how TVET students are trained with the relevant employability skills by the higher education institutions. The investigation focused on the graduate employability development activities and industry involvement in preparing them for the workforce. The following questions guided the investigation.

a) What are the in-class activities among the selected group of TVET students?
b) What are the out-of-class activities among the selected group of TVET students?
c) What are the types of industry involvement provided for the selected group of TVET students?
d) What is the relationship between the respondents' perceptions of in-class activities and real-world incorporation?
e) What is the relationship between the respondents' perceptions of out-of-class activities and industry involvement?

2. Literature review

TVET in Malaysia

TVET is a critical component of the educational system not only in Malaysia but across the world as it represents the forefront educational basis of addressing the need for skilled labour across a variety of industries. It plays an integral role in addressing the enhancement of a nation's employability and economic development with its supply of skilful individuals. As stated by Hawati and Tan (2023), TVET graduates are trained with both theoretical knowledge and practical skills enabling them to be more employable by the industries compared to non-TVET graduates. According to UNESCO (2015), TVET's contribution to a nation's economic productivity and growth stems from actively producing graduates equipped with necessary skills in technical domains. This is also the case since TVET programmes are designed to meet the demands of the industries. Additionally, it is proposed that TVET could overcome serious societal issues such as reducing unemployment rates and improving economic growth.

Malaysia has been promoting and implementing TVET programmes since the early 1970s, aiming to develop a skilled and competent workforce that support the country's development goals (Ismail, Nugroho & Rohayati, 2023). TVET programmes in Malaysia are offered by various institutions, including public and private universities, polytechnics, community colleges, and vocational colleges. These programmes are designed to provide students with hands-on training and skills that are relevant with the industry needs (Ismail, Chik & Hemdi, 2021). TVET Programme Standards issued by Malaysian Quality Agency (MQA) have clearly specified the heavy emphasis on the practical and technical component of the curriculum (MQA, 2019). Malaysian government has introduced various initiatives to enhance the quality and relevance of TVET programmes, such as the National Dual Training System (NDTS), which combines institutional training with on-the-job training (OJT) (Abd

Baser, Jizat, Yunus, Rahim, Razzaq & Hasan, 2017). Internship programmes are an essential component of TVET programmes in Malaysia, providing students with opportunities to gain practical experience in a real-world work environment (Shaharuddin, Mokhtar, Isa & Dafi, 2022). These programmes are typically offered as part of the curriculum, and students are required to complete a certain number of hours of internship before graduating (MQA, 2019).

Nonetheless, besides internship and mentoring programmes which are normally offered towards the end of the TVET programme; the graduates are also exposed to relevant employability skills in the courses throughout their study programme. The teaching and learning activities during the conduct of the courses within the programme curriculum would include activities such as group projects and presentation, simulations and portfolio, which would harness the students' employability skills (TVET Programme Standard, MQA, 2019).

TVET and employability skills development

TVET graduates could showcase higher productivity in their work performance mainly due to their practical skills. These skills typically involve skills and labour in specialised areas, those of which are trained within TVET programmes especially those that involve strategic partnership with the industries in the training process (Ismail et al, 2021). Furthermore, the programmes often encourage their students to practise and apply theoretical knowledge in strengthening their practical skills and knowledge. This in turn, promotes a higher sense of problem-solving skills and further expands the utilisation of their technical abilities. Consequently, TVET graduates also showcase a higher comprehension in adapting to situations hence, promoting other skills such as innovation (Thomas, Jamaluddin & Abdullah, 2023). The necessity to include elements of practical and technical know-how in the programmes play an integral part of the TVET curriculum leading to TVET graduates displaying improved technical and technological integration in their work problem-solutions.

Nevertheless, TVET graduates need to employ a series of graduate employability skills to maintain their relevance and competitiveness in the labour market besides the technical and technological skills (Noor, 2023). For instance, the pivotal skills that are heavily demanded by industries involve interpersonal skills such as problem-solving and critical thinking. Other areas of modern graduate employability skills include active learning, flexibility and stress tolerance. In terms of technical skills, the desired skills to adapt to the age of digitalisation are specialised skills like product marketing, digital marketing and human-computer interactions.

World Economic Forum (WEF, 2023) presented the top ten skills of the future or the emerging graduate employability skills into four different constructs. Those constructs are *problem-solving*, *self-management*, *technology use and development*, and *working with people*. The following figure depicts the ten skills espoused by the World Economic Forum.

Type of Skill	Graduate Employability Skill
Problem-solving	Analytical thinking and innovation
	Complex problem-solving
	Critical thinking and analysis
	Creativity, originality and initiative
	Reasoning, problem-solving and ideation
Self-management	Active learning and learning strategies
	Resilience, stress tolerance and flexibility
Technology use and development	Technology use, monitoring and control
	Technology design and programming
Working with people	Leadership and social influence

Fig. 1 World Economic Forum (2023) top 10 skill

Graduate employability skills encompass a range of non-technical skills that enhance the graduates' ability to gain employment and to succeed in the workplace. These include communication, teamwork, problem-solving, adaptability, and critical thinking. Graduate employability is a set of achievements related with skills, understandings, and personal attributes, those of which make the graduates more likely to gain employment and be successful in their chosen occupations (Dali, Nawang, Hamid, Misbah, Nawai & Johari, 2023). The primary goal of TVET is to prepare students for specific trades, crafts, and careers at various levels of expertise. However, the modern job market demands more than technical and technological proficiency. Employers seek individuals who can work well in teams, communicate effectively, and adapt to changing circumstances. The integration of employability skills into TVET programmes is thus essential for producing well-rounded graduates capable of thriving in a diverse work environment.

Strategies in developing employability skills among TVET graduates

The development of employability skills in TVET is critical in preparing graduates who meet the demands of the industry. A holistic approach in curriculum design that integrates employability skills across all aspects of teaching and learning in a TVET programme is essential. This involves embedding the employability skills into technical courses rather than treating them as standalone subjects. At this point, the teaching and learning strategies play an important role in facilitating the GE skills development. For example, incorporating teamwork and communication tasks into technical projects could enhance the students' soft skills alongside their technical expertise. Leveraging technology could also enhance the development of the students' employability skills. Online simulations, virtual teamwork platforms, and e-portfolios are relevant teaching tools that could provide students with opportunities to practise and showcase their soft skills (Frey and Osborne, 2017).

The development of analytical thinking and innovation skills through curricula that emphasise critical thinking, problem-based learning, and creative exercises is also vital. Courses that incorporate case studies, simulations, and project-based learning are particularly effective. According to Asefar and Abidin (2021), TVET students who were exposed to problem-based learning environments exhibited improved analytical and innovative thinking abilities which in turn prepared them for the complexities of the workforce.

Among the strategies that develop analytical thinking and innovation skills include workshops, mentorship, and collaborative projects. Experiential learning methods, such as on-the-job training and innovation labs which provide practical experience and foster creativity are also some of the common strategies employed by the HEIs. Both industry and universities play an important role in developing relevant GE skills suitable for future employment among the TVET graduates (Rahayu, 2023). Specific techniques such as root cause analysis, SWOT analysis, and decision trees help students evaluate situations comprehensively and make informed decisions (Maina, Guàrdia Ortiz, Mancini, & Martinez Melo, 2022). The opportunity provided from such techniques further encourage creativity and risk-taking which are essential for fostering innovation.

Leveraging technology to support analytical and innovative thinking is increasingly important in modern workplaces. Tools such as data analytics software, simulation programmes, and digital collaboration platforms can enhance these skills by providing new ways to analyse information and generate ideas (Siriwardhana & Moehler, 2023). Integrating technology into work processes can significantly improve analytical capabilities and drive innovation, leading to better decision-making and competitive advantage.

Constructivist Learning Theory

The present study was conducted with the influence of the constructivist learning theory. Constructivists are proponents of learning that encompass the need for learners to experience and interact with the better able known as the more knowledgeable others (MKOs) (Vygotsky, 1978). For learning to be effective and successful, learners need to be exposed to activities that encourage them to apply both the lower and higher order thinking skills through meaningful activities and interaction with peers and practitioners (Bandura, 1986). As the students participate in active learning activities, they could be formulating new knowledge and adding new knowledge and skills to what they already know

as they gain more and more experiences. In this instance, learning constructively is also seen as learning cumulatively (David, 2015). Constructivism believes in learning by building knowledge together with peers, instructors and the practitioners as some of them are the MKOs.

In TVET programmes, learning is always seen as hands-on and practical-based making constructivism a theory that supports active learning among the students (Noor, 2023). The social experiences that form the meaning-making in TVET programmes provides various opportunities for the students to apply, evaluate and create their own and new understanding. Unlike other academic programmes that may focus more on the cognitive domain besides the psychomotor and affective domains, TVET programmes are academic programmes that put most emphasis on the psychomotor besides the cognitive and affective domains (*ibid*.).

Hence, realising the importance of the psychomotor learning domain in TVET programmes, it is only acceptable for constructivism to be most relevant in strategizing relevant learning activities for TVET students' effective learning experiences. Most importantly as psychomotor domain is best trained with the facilitation of the practitioners and experts, it is vital that learning experiences are as comprehensive as possible involving activities both in and out of class and industry involvement too. The present study applies this concept in the conduct of the investigation. It does so by investigating the various activities, both in and out of class as well as the industry involvement in the development of the selected TVET students' GE skills. TVET graduates need to be well-trained in not only cognitive and affective domains but most importantly in the psychomotor domain (Hawati, 2023).

Experiential Learning Theory

Constructivism Learning Theory has influenced the teaching and learning process in many ways especially in terms of the active roles and participation of the students in their learning process. Kolb (1984) who espoused Experiential Learning Theory is an educationist who puts great emphasis on the role of students' experiences and the process of experiencing the learning journey itself. Experiential learning adapts a holistic approach and highlights how experience, cognition, environmental factors and emotions influence the learning process.

In other words, learning is best done by engaging the students in hands-on activities that require them to reflect. Reflecting on their experiences during the hands-on activities could encourage an active thinking process that connects theories and knowledge learned in the classroom to real-world contexts. In this regard, learning is best done by 'doing'. Past studies (Dahri, Chinedu, Gull & Colcha Ortiz, 2024; Prianto, Winardi & Qomariyah, 2021; Trividad, 2024) have confirmed that GE could be developed through learning from experience.

In this theory, four stages which are cyclical in nature are prominent in the meaning-making of a new knowledge and skills mastery. The four stages are concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984). In simpler terms, the four-stage learning process could also be described as 'experiencing, reflecting, thinking and acting' (Peterson, Decato & Kolb, 2014). The present study regards the relevance of this theory as it seeks to investigate the activities the selected TVET students are involved in during their study. This explains why the present study focuses on the in and out of class activities as well as the industry involvement in the development of the GE skills.

Review of past studies

Several studies concerning the learning activities among higher education students have been conducted. The relevant past studies include assessing the existing curriculum (Abd Majid, Haslee Sharil & Kamaruzaman, 2023), identifying students' learning strategies (van Der Gulden, Heeneman, Kramer, Laan, Scherpbier-de Haan & Thoonen, 2020), investigating the integration of technology in teaching and learning (Zalli, Nordin & Hashim, 2019), identifying factors to students' motivation and performance (Cetin-Dindar, 2016). Most interestingly, most of these students were interested in studying higher education students in general while very few were interested in TVET students.

Some of the studies that included TVET students were on their learning preferences (Dahri, Chinedu, Gull & Colcha Ortiz, 2024), their work readiness (Prianto, Winardi & Qomariyah, 2021) and their communication skills and English proficiency (Tividad, 2024). Most of the studies were conducted

based on quantitative research design employing surveys and a few were based on mixed methods involving both survey and interviews. There are also a few studies conducted based on qualitative research design employing interviews and observations.

The present study however has a different focus as it intends to investigate the learning activities that facilitate the TVET students' GE skills development based on the constructivism learning theory. The present study hopes to fill in the gap by providing relevant insights to further understand how best TVET students could be prepared for the workforce.

3. Methodology

The investigation was conducted based on a quantitative research design. As the aim of the investigation is to seek the selected TVET students' perceptions of their in-class, and out-of-class activities as well as their involvement with the industry in developing their GE skills during the programme, a set of questionnaires was administered to a group of students from a TVET programme in one of the public universities in Malaysia. Therefore, as the present study seeks to investigate the TVET students' perceptions of their GE skills development during their study, only the final year students were chosen as they would have the most learning experience in the programme. Based on the number of final year student population in the selected TVET programme, a total of 191 students was identified as the sample. However, upon data cleaning a total of 169 respondents was finally identified as the samples.

A set of questionnaires was administered through an online platform to the targeted samples. The questionnaire was adapted based on past studies and reports on graduate employability among university students conducted by Schwarzer and Jerusalem (1995), Bass and Avolio (1996), US Department of Education (2010) and WEF (2023). A pilot study was conducted and Cronbach's alpha value of .977 was achieved suggesting an actual data collection and analysis. The table below summarizes the reliability value.

Table 1. Cronbach's alpha value

Cronbach's Alpha	N of Items
.977	84

In addressing the instrument's validity, a group of experts was appointed as a panel of reviewers. Three experts, all of whom are experts in education, training and professional development respectively were appointed to review the adapted questionnaire. Their review was collected, and revisions were done to the relevant items. Most of the revisions were on the sentence clarity and order, while a few were also deleted and re-phrased.

The questionnaires consisted of items that corresponded to the identified sub-constructs and were on a Likert scale between 1 (strongly disagree) to 7 (strongly agree). Constructivist learning theory serves as the main reference in the design of the adapted questionnaire. As elaborated earlier, learning experiences in the constructivism theory should be comprehensive and cumulative consisting of opportunities for knowledge application and meaning making through interaction with the more knowledgeable ones. Hence, the constructs comprised perceptions of activities in and out of class as well as industry involvement. Since the data was based on the mean scores of each sub-construct in the questionnaire, a descriptive statistics using SPSS version 25 was conducted. To illustrate the potential relationship between the relevant variables, a Pearson correlation analysis was also done.

4. Findings and Discussions

The following are the data presentation followed by the findings and discussions based on each research question. As signified by Table 2, a total of 169 respondents from a selected TVET programme were involved in the data collection, comprising 39.1% male and 60.9% female respondents. All of them were in their final year of a four-year degree programme. Table 3 summarises the respondents' age range. The majority (56.2%) were between 21 and 23 years old and the rest (43.8%) were above 24 years old.

Table 2. Distribution by gender

		Frequency	Percent
Valid	Male	66	39.1
	Female	103	60.9
	Total	169	100.0

Table 3. Distribution by age

		Frequency	Percent
Valid	21-23	95	56.2
	24 and above	74	43.8
	Total	169	100.0

The first research question focused on the in-class activities which developed the students' employability skills, and the tables below signify the responses.

Table 4. Types of in-class activities relating to GE skill development

		Group projects	**Simulations**	Role-playing exercises	Problem-based learning tasks	Develop portfolio	Internship or work experience placements
N	Valid	166	89	106	121	108	148
	Percent (%)	98.2	52.7	62.7	71.6	63.9	87.6

As can be seen from Table 4, most of the students agreed that they were exposed to groups projects (98.2%), followed by internship (87.6%) and problem-based learning (71.6%) while following the courses. The least popular in-class activity was simulations (52.7%) followed by role-playing (62.7%). To further understand the respondents' perceptions of their in-class activities, Table 5 summarises their in-class activities experiences. On a Likert scale of 1 (Mostly disagree) to 7 (Mostly agree), the overall mean score is 5.39. The item '*I believe role-playing exercises help me develop communication and interpersonal skills essential for the workplace*' has the highest mean score (5.52) while the item 'I was involved in practical hands-on activities integrated into my TVET courses to enhance my employability skills' has the lowest mean score (5.22).

Table 5. Respondents' perceptions of their in-class activities experiences

	N	Mean	Std. Deviation
I was involved with practical hands-on activities integrated into my TVET courses to enhance my employability skills.	169	5.22	1.209
I find group projects in developing teamwork and collaboration skills, which are essential for employability, very effective.	169	5.36	1.231
I was involved with real-world scenarios incorporated into my coursework to develop problem-solving skills relevant to my field of study.	169	5.49	1.124
I believe role-playing exercises helps me develop communication and interpersonal skills essential for the workplace.	169	5.52	1.006
Overall mean	169	5.3964	.94708
Valid N (listwise)	169		

Table 6 on the other hand presented the respondents' perceptions of the integration of real-world contexts in the classroom with the overall mean score is 5.61. Item '*I am satisfied with the effort made by my lecturers or instructors to integrate real-world skills into their lessons to enhance my employability*' has the highest mean score (5.76) followed by the lowest mean score (5.50) '*My lecturers or instructors incorporate industry-specific projects or assignments into the curriculum to develop my practical skills and enhance my employability*'.

Table 6. Respondents' perceptions of real-world incorporation in the class

	N	Mean	Std. Deviation
My lecturers or instructors relate course content to current industry practices and trends during their teaching.	169	5.61	.780
I believe the use of real-world scenarios by my lecturers or instructors in helping me understand the practical application of employability skills were effective.	169	5.67	.897
My lecturers or instructors encourage discussions or debates on real-world challenges relevant to my field of study, which can enhance my employability skills.	169	5.54	.831
My lecturers or instructors invite guest speakers from industry to share their experiences and insights related to employability skills with the class.	169	5.60	.959
My lecturers or instructors incorporate industry-specific projects or assignments into the curriculum to develop my practical skills and enhance my employability.	169	5.50	.810
I am satisfied with the efforts made by my lecturers or instructors to integrate real-world skills into their lessons to enhance my employability.	169	5.76	.863
Overall mean	169	5.6134	.66278
Valid N (listwise)	169		

Tables 4,5 and 6 have provided salient findings to answer the first research question. In identifying the in-class activities in developing GE skills among the selected TVET students, there still need to be equal emphasis on other activities that could promote GE skills development besides the common group projects and internship which is compulsory in the curriculum. The respondents' overall perceptions of the in-class activities experiences and the incorporation of real-world aspects during the lessons seem to suggest a limited exposure to a variety of potential in-class activities especially those that could bring real-world scenarios into the classroom.

Hence, it is noted that much has yet to be regarded in terms of the development of the students' GE skills through in-class activities. According to the Malaysian Quality Agency (MQA) TVET Programme Standard (2019) and Ismail (2018), the practical and technical components of the TVET programmes carry the most weightage and that these components are what make the graduates industry ready as compared to non-TVET graduates.

The second research question was posed to identify the out-of-class activities which developed the students' employability skills, and the tables below signify the responses. Table 7 summarizes the out-of-class activities the respondents were exposed to while studying. Attending workshops or seminars conducted by industry professionals seem to have the highest percentage (76.3%) followed by volunteer work or community service projects (45%) and industry visits or field trips (44.4%). On the other hand, studying abroad or international exchanges and participating in competitions or hackathons related to their field of study with 10.1% and 37.3% respectively seem to be the least activities provided in the programme.

Table 7. Types of out-of-class activities relating to GE skill development

		Industry visits or field trips	Workshops or seminars conducted by industry professionals	Volunteer work or community service projects	Competitions or hackathons related to your field of study	Study abroad programmes or international exchanges
N	Valid	75	129	76	63	17
	Percent (%)	44.4	76.3	45	37.3	10.1

Table 8. Respondents' perceptions of their out-of-class activities experiences

	N	Mean	Std. Deviation
I have frequently participated in out-of-classroom activities aimed at enhancing my graduate employability skills during my TVET programme.	169	4.46	1.296
I consider out-of-classroom activities in developing practical skills and enhancing my employability as an effective approach.	169	5.37	.884
I believe out-of-classroom activities have helped me network with professionals in my industry, which can enhance my employability.	169	5.37	.917
My TVET programme offer opportunities for internships, apprenticeships, or work-study programmes outside the classroom to develop my employability skills.	169	5.39	.995
I feel that internships, apprenticeships, or work-study programmes can contribute to my readiness for employment in my field of study.	169	5.63	.918
I am satisfied with the range and availability of out-of-classroom activities provided by my TVET programme to enhance my employability.	169	5.18	.996
Overall mean	169	5.2318	.79746
Valid N (listwise)	169		

Table 8 depicts the respondents' perceptions of their out-of-class activities. It is noted that the overall mean score is 5.23. Item 'I feel that internships, apprenticeships, or work-study programmes can contribute to my readiness for employment in my field of study' has the highest mean score (5.63) and the item 'I have frequently participated in out-of-classroom activities aimed at enhancing my GE skills during my TVET programme' has the lowest mean score of 4.46. The item with the next lowest mean score (5.18) is 'I am satisfied with the range and availability of out-of-classroom activities provided by my TVET programme to enhance my employability'.

In identifying the respondents' perceptions of their out-of-class activities, a similar concern was detected in which much have yet to be provided to the TVET students in facilitating their GE skills through activities outside the boundary of the classroom. It is noted that based on a Likert scale of 1 (mostly disagree) to 7 (mostly agree), the overall mean scores, the highest and the lowest mean scores seem to suggest much more could be done in exposing the TVET students to out-of-classroom activities that could facilitate their GE skills development.

As stated by Asefar and Abidin (2021), TVET students who were exposed to problem-based learning environments exhibited improved analytical and innovative thinking abilities which in turn prepared them for the complexities of the workforce. They concluded that out-of-classroom activities such as workshops, mentorship, and collaborative projects could facilitate the relevant GE skills. Maina et al (2022) confirm the importance of out-of-classroom activities when they claim experiential learning methods, such as on-the-job training and innovation labs could provide practical experience and foster

creativity which further assist the students evaluate situations comprehensively and make informed decisions.

Answers to the third research question, 'What are the types of industry involvement provided for the selected group of TVET students?' could be discovered by studying the following tables. As seen in Table 9, the most common industry involvement was during internship or work placement opportunities (89.3%). Whereas the least common industry involvement was mentorship programmes with industry experts (32%).

Table 9. Industry involvement in developing TVET students' GE skills

		Collaborative research projects	Internship or work placement opportunities	Guest lectures or workshops conducted by industry professionals	Industry-sponsored projects or competitions	Mentorship programmes with industry experts
N	Valid	88	151	100	76	54
	Percent (%)	52.1	89.3	59.2	45.0	32.0

In understanding the respondents' perceptions of the industry involvement in developing their GE skills, Table 10 provides the summary of their perceptions. It is noted that the overall mean score is 5.18. The item with the highest mean score (5.32) is 'I believe university-industry partnerships in providing students with insights into industry practices and expectations related to employability is effective' and the item with the lowest mean score (5.09) is 'My university facilitate interactions between students and industry representatives to discuss employability skills and career opportunities'.

Table 10. Respondents' perceptions of the industry involvement

	N	Mean	Std. Deviation
I believe university-industry partnerships contribute to the development of employability skills among TVET undergraduate students.	169	5.21	1.046
My university facilitate interactions between students and industry representatives to discuss employability skills and career opportunities.	169	5.09	1.274
I believe university-industry partnerships in providing students with insights into industry practices and expectations related to employability is effective.	169	5.32	1.157
I personally benefited from the industry partnerships established by my university in terms of enhancing my employability skills.	169	5.16	1.269
I am satisfied with the university's efforts in establishing and maintaining industry partnerships to enhance graduate employability skills	169	5.15	1.144
Overall mean	169	5.1870	1.04725
Valid N (listwise)	169		

The salient findings on the industry involvement in developing GE skills among the selected TVET students yielded from Tables 9 and 10 seem to echo the findings for research question 2, i.e. on the state of the out-of-class activities. In relating to the exposure to the industry during their studies, the respondents seem to suggest that more could be done based on the overall mean score and the mean scores obtained for the items that showed highest and lowest mean score. The findings from Table 11 specifically confirm the much-needed improvement in the activities that include the participation of the industry whether in the class or out of the class teaching and learning hours.

Ismail, Chik and Hemdi (2021) and Thomas et al (2023) have proposed a curriculum framework that include the strategic partnership with the industry in developing the GE skills among the TVET

students. On the same note, Aqli et al (2019) has asserted that since TVET graduates are highly in demand for practical and technical specific industries, the involvement of the industries in the TVET programme training only seem most appropriate. This is also emphasized by Rahayu (2023) as she claims the important role of the industry in developing the GE skills among TVET students.

Finally, in determining the relationships between the respondents' perceptions of their in-class activities and real-world integration, a regression analysis was conducted. The following is the analysis and interpretation.

Table 11. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.518[a]	.269	.264	.56852	1.956

a. Predictors: (Constant), INCLASS
b. Dependent Variable: REALWORLD

Table 12. ANOVA Results

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.821	1	19.821	61.324	.000[b]
	Residual	53.978	167	.323		
	Total	73.798	168			

a. Dependent Variable: REALWORLD
b. Predictors: (Constant), INCLASS

Table 13. Coefficients for regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.656	.254		14.410	.000		
	INCLASS	.363	.046	.518	7.831	.000	1.000	1.000

a. Dependent Variable: REALWORLD

The Model Summary indicates that the R value of 0.518 suggests a moderate positive correlation between in-class activities and real-world incorporation, consistent with the interpretations of correlation coefficients as outlined by Field (2024). The R^2 value of 0.269 shows that approximately 26.9% of the variance in real-world incorporation can be explained by in-class activities, which aligns with the explanation provided by Hair, Black, Babin and Anderson (2010) regarding the proportion of variance explained by the independent variable. The Adjusted R^2 of 0.264 is slightly lower than the R^2, suggesting that the model is reasonably well-fitted and would generalise well to other samples (Cohen, Cohen, West & Aiken, 2003). This slight reduction in the adjusted R^2 compared to R^2 is a common occurrence in regression analysis, indicating the model's reliability when applied to different data sets (Tabachnick & Fidell, 2013). The Durbin-Watson statistic of 1.956 suggests that there is no significant autocorrelation in the residuals, further supporting the robustness of the model, as explained by Frost (2020).

Next, the ANOVA shows that the F-statistic value of 61.324 with a significance level (p-value) of 0.000 indicates that the model is statistically significant, meaning that in-class activities significantly predict real-world incorporation. This interpretation is consistent with the guidelines provided by Hair et al. (2010) on the importance of the F-statistic and p-values in determining the overall significance of the model. Finally, the coefficients show that the unstandardized coefficient for in-class activities is

0.363, meaning that for every unit increase in in-class activities, real-world incorporation is expected to increase by 0.363 units. The standardised Beta coefficient of 0.518 indicates the strength of the relationship, showing that in-class activities have a significant and positive impact on real-world incorporation (Cohen et al., 2003). The t-value of 7.831 with a p-value of 0.000 further confirms that the relationship is statistically significant, consistent with the interpretation guidelines provided by Field (2024).

Next, in determining the relationships between the respondents' perceptions of their out-of-class activities and industry involvement, a regression analysis was conducted. The following is the analysis and interpretation.

Table 14. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.595[a]	.354	.350	.64288	1.934

a. Predictors: (Constant), INDUSTRY
b. Dependent Variable: OUTOFCLASS

Table 15. ANOVA Results

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.820	1	37.820	91.508	.000[b]
	Residual	69.020	167	.413		
	Total	106.840	168			

a. Dependent Variable: OUTOFCLASS
b. Predictors: (Constant), INDUSTRY

Table 16. Coefficients for regression

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2.882	.251		11.500	.000		
	INDUSTRY	.453	.047	.595	9.566	.000	1.000	1.000

a. Dependent Variable: OUTOFCLASS

The Model Summary shows that the R value of 0.595 indicates a stronger positive correlation between industry involvement and out-of-class activities compared to the first regression, aligning with the interpretation guidelines provided by Field (2024). The R^2 value of 0.354 shows that approximately 35.4% of the variance in out-of-class activities can be explained by industry involvement, as explained by Hair et al. (2010) in their discussion on the proportion of variance explained by the independent variable. The Adjusted R^2 of 0.350 suggests that the model is a good fit and would generalise well to other samples, a point underscored by Cohen et al. (2003) in their analysis of model fit and generalisation. This close alignment between R^2 and Adjusted R^2 indicates a robust model that is likely to perform well with different data sets, as noted by Tabachnick & Fidell (2013). Furthermore, the Durbin-Watson statistic of 1.934 suggests that there is no significant autocorrelation in the residuals, which is an important consideration for the validity of the model, as discussed by Frost (2020).

On the other hand, the ANOVA results show that the F-statistic value of 91.508 with a significance level (p-value) of 0.000 indicates that the model is statistically significant, meaning that industry involvement significantly predicts out-of-class activities. This interpretation is in line with Hair et al. (2010), who emphasise the importance of the F-statistic and p-values in determining model significance. In addition, the coefficients indicate that the unstandardized coefficient for industry

involvement is 0.453, meaning that for every unit increase in industry involvement, out-of-class activities are expected to increase by 0.453 units. The standardised Beta coefficient of 0.595 indicates that industry involvement has a strong and significant positive impact on out-of-class activities, as supported by Cohen et al. (2003). The t-value of 9.566 with a p-value of 0.000 confirms that the relationship is statistically significant, consistent with the interpretation guidelines provided by Field (2024).

These interpretations suggest that both in-class activities and industry involvement are significant predictors of their respective dependent variables, in this case, real-world incorporation and out-of-class activities. The models are statistically significant and explain a meaningful proportion of the variance in the dependent variables, aligning with the standard practices in regression analysis as outlined by the aforementioned authors. Experiential Learning theory (Kolb, 1984) and Constructivism Learning theory (Vygotsky, 1978) could best be referred to in understanding the interpretation of the analysis. As described by these theories, practical and hands-on activities could be made more meaningful when students are given the opportunities to experience real-world contexts. Similarly, effective student engagement in their own learning process takes place when there are involvement by the more knowledgeable others (MKOs) such as the industry players.

5. Conclusion

Much emphasis has been given to TVET programmes recently. The Malaysian government has taken serious initiatives and allocated generous funding towards strengthening the current and potential TVET programmes in higher education institutions. As the investment in TVET programmes is mounting each year, the return of investment (ROI) in terms of the graduates' quality has become a central focus. Graduate employability among TVET graduates is a clear indicator of the said ROI. Therefore, investigating the strategies employed by the higher education institutions in developing the TVET students' GE is a constant responsibility. Every TVET lecturers, curriculum designer, policymakers and top management should be enlightened by the need to seriously look at the curriculum review. The review should focus on the strategies that facilitate the GE skills development through heavy practical, hands-on and industry-involved activities as suggested by the salient findings of the present study. The regression analysis further confirms the important roles of integrating real-world contexts in the class and the need to involve the industry especially in out-of-class activities. The positive correlations between the variables reiterate the relevance of constructivism learning and experiential learning theories. Hence, constructivism learning theory and experiential learning theory need to be fully regarded in the design of the TVET curriculum particularly in the potential of optimising students' active engagement in their own learning through hands-on, practical-based and opportunity to learn from the practitioners through industry involvement.

6. Co-author contributions

Author 1 was responsible for the overall write-up of this paper, Author 2 and 4 contributed in terms of the final discussions and language editing and Author 3 administered the survey, did the data analysis and wrote the literature review.

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