

# Employment Competency of Graduates from Higher Vocational Colleges and Universities Based on the Perspective of Enterprises' Needs Empirical Analysis

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## Abstract

This study investigates the alignment between the employability skills of graduates from higher vocational colleges and universities and the needs of employers. A survey was conducted involving 33 employers and 367 students to assess the current demand for employability skills and the level of these skills among graduates. This study examines the core employability competencies based on the Knowledge, Skills, Abilities, and Other Characteristics (KSAO) model. The research further explores the match between the supply of graduates' competencies and the demand from employers, utilizing the theory of person-organization fit. Additionally, a Structural Equation Modeling (SEM) approach is employed to construct and analyze a model of factors influencing the core employability competencies of graduates. The findings provide valuable insights for society, educational institutions, and students, offering new perspectives on enhancing the employability of higher vocational graduates.

## 1. Introduction

In recent years, rapid societal changes and industrial transformations have led to overexpansion of higher education, resulting in a significant gap between the preparation and utilization of the workforce in many countries (Stan et al., 2022). This imbalance between supply and demand has caused the number of graduates to far exceed the available job opportunities, adversely affecting social and economic development (Stan et al., 2022). Consequently, higher education institutions face the critical challenge of enabling students to apply their knowledge effectively, develop high-quality and innovative human resources, enhance professional competencies, foster cross-disciplinary and international mobility, and adapt to active learning (Bozionelos et al., 2020).

Higher education graduates are a crucial demographic for employment, and improving their employment outcomes is a pressing issue. According to the Ministry of Education, the number of national ordinary college graduates in 2023 reached 11.58 million, an increase of 820,000 from the previous year, highlighting the significant employment pressure due to insufficient job demand and structural unemployment (Xi & Yan, 2023). In the context of the employment priority strategy and high-quality economic development, assessing the employability of higher vocational graduates and the alignment of supply and demand is crucial. Cultivating talents needed for high-quality development and prioritizing the employment strategy for higher vocational graduates are essential for a robust vocational education system (Li, 2022).

## 1.1 Status of Research on Employability

The concept of employability originated in Britain in the early 20th century. Beveridge, a renowned British economist, first defined *employability* in 1909 as the ability to secure and retain employment. In China, scholars have further elaborated on this concept. Ma (2020) defines *employability* as the ability of college students to outperform competitors in the job market and secure positions that fulfill their self-worth and meet societal and employer needs. Zhu (2021) describes employability as a comprehensive ability encompassing quality, knowledge, and skills developed through university education and self-learning. Wu (2021) identifies critical components of employability, including employment development ability, innovation ability, social coping ability, and employment quality ability. Lv (2023) developed a model for higher vocational students covering five competency dimensions: methodological competence, technical competence, social competence, learning competence, and individual traits, with 21 specific competency elements such as responsibility, numerical competence, innovative competence, and complex problem-solving competence.

Research on matching employability supply and demand includes theoretical studies focusing on supply-side structural reform. Cui (2020) suggests addressing the employment challenges of college graduates by applying supply-side theory, highlighting the inadequacy of some graduates' skills and the low matching of employability supply and demand. Sun (2021) explores optimizing the structure of college students' employability from a talent cultivation perspective, advocating for the integration of supply and demand to cultivate comprehensive talents society needs. Studies from the employer's perspective, such as those by Deng and Zhang (2021), categorize employability into general and professional qualities based on interviews with human resource managers. Qing (2020) analyzes the employability needs of doctoral graduates and the supply-demand matching through cross-national survey data, proposing an interactive and cooperative mechanism among stakeholders.

Despite extensive research on employability from graduates' perspectives, there is a lack of studies focusing on the supply-demand matching between graduates and employers, particularly for higher vocational graduates. These graduates often have diverse employment opportunities across various industries, yet their employability frequently does not meet market demands. This study aims to address this gap by analyzing survey data from graduates and employers, focusing on three key issues:

- Assessing the importance of each employability competency from the perspectives of graduates and employers to identify gaps between supply and demand.
- Evaluating whether the talent training programs for graduates align with employer needs.
- Conducting self-assessments of employability by graduates and evaluations by employers to clarify existing mismatches.

## 1.2 Employment Core Competency Dimension

The KSAO model is based on the description of the qualification of occupational positions to cultivate students' job occupational literacy, and the KSAO model is used as a basis to improve the core competencies of university employment and to enhance the competitiveness and adaptability of finance majors in the practice of their profession (Zhang & Xiang, 2020). KSAO is the abbreviation of "knowledge, skill, ability, other characteristics," which is the description model of human resource management on the qualification of employees' occupational positions. Knowledge refers to the professional knowledge and job knowledge required to complete a job task; Skill refers to the degree of proficiency in the use of a particular tool or operation of a specific equipment in the work and the completion of a specific job task, including practical work skills and experience; Ability refers to the general ability required to develop specific, specific skills, such as learning ability, ability to learn, ability to work, ability to work; Other Characteristics mainly refers to other personality traits needed to effectively complete a job, such as work attitude, and personality (Liu et al., 2020).

## 2. Methodology

This study employed a comprehensive methodology to gather and analyze data on the employability competencies of graduates from higher vocational colleges and universities, aligning with employer needs. The primary data were collected through questionnaires, and the analysis was conducted using SPSS 27.0 for basic descriptive statistics and reliability and validity testing. Structural Equation Modeling (SEM) was performed using Amos 27.0 to measure the relationships between factors assessing the core competencies of university graduates.

The research design for this study was a cross-sectional survey, which allowed for data collection at a single point in time from a diverse sample of students and employers. This design was chosen to provide a snapshot of employability competencies' current state and alignment with employer needs. The study was conducted from September 2023 to October 2023 in Guangdong Province, China. A random sampling technique was used to select 406 students from seven higher vocational colleges and universities in Guangdong Province. All respondents were recent graduates from finance programs. Additionally, 33 employers, including general managers, personnel

managers, and recruiters, participated in this study and were selected using purposive sampling techniques. However, limitations in this sampling process include potential biases due to non-response or the specific focus on finance programs, which may need to capture the diversity of employability competencies across different disciplines fully.

Two questionnaires were used to gather information about students' core competency level and employers' perspectives towards graduates' core competency level. A five-point Likert scale was used to rate the measurement items. The online questionnaire link was distributed via WeChat. Samples were informed about the study's purpose, asked to respond based on their personal opinions, and assured of anonymity and confidentiality. Participation was voluntary, and informed consent was implied through the completion of the questionnaire. The internal consistency of the measurement instrument was assessed using Cronbach's Alpha coefficient. According to IBM (2012), alpha values between 0.70 and 0.90 are considered appropriate. The instrument's alpha coefficient of 0.90 indicated high reliability. Cronbach and Shavelson (2004) deemed a reliability rating of 0.70 or above acceptable. This methodology ensures a robust and comprehensive analysis of the employability competencies of higher vocational graduates, providing valuable insights into the alignment between graduate skills and employer needs.

### 3. Results and Discussion

Exploring factor analysis is to measure the structural validity of the scale; it is to determine whether the measured variables of each latent variable have stable consistency and structure; it is the most commonly used index when evaluating the validity of the scale; this paper applies the SPSS27.0 software to test the dimensional composition. When using factor analysis for validity analysis, first of all, we need to determine whether to meet the conditions of factor analysis; generally, we need to meet two conditions: first is the need for a KMO value greater than 0.7; second, the test of Bartlett's sphericity is less than 0.05, if the two conditions are met indicates that there is a strong correlation between the observed variables, which is suitable for doing factor analysis. The specific results are shown in Table 1.1.

**Table 1** *KMO and Bartlett's Test Result*

|                               |                    |          |
|-------------------------------|--------------------|----------|
|                               | Kaiser-Meyer-Olkin | 0.954    |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 7585.809 |
|                               | Df                 | 496      |
|                               | Sig.               | 0.000    |

The results of the test show that the KMO test value of the survey data is 0.954, which is greater than 0.70, indicating that the questionnaire is suitable for factor analysis. Bartlett's test of sphericity shows that the approximate chi-square value is 7585.809, which is a relatively large value, and the probability of significance is 0.000 ( $P < 0.01$ ). Therefore, the null hypothesis of Bartlett's test of sphericity is rejected, and it is considered that the scale is suitable for factor analysis and, therefore, has a good validity structure.

The authors used AMOS27.0 to conduct the scale's validation factor analysis to verify further the validity of the 4-dimensional structural model of higher vocational students' employability. In order to validate the sample data, the authors first carried out the preliminary construction of the model of higher vocational students' employability with the help of AMOS27.0 software, as shown in Figure 1.

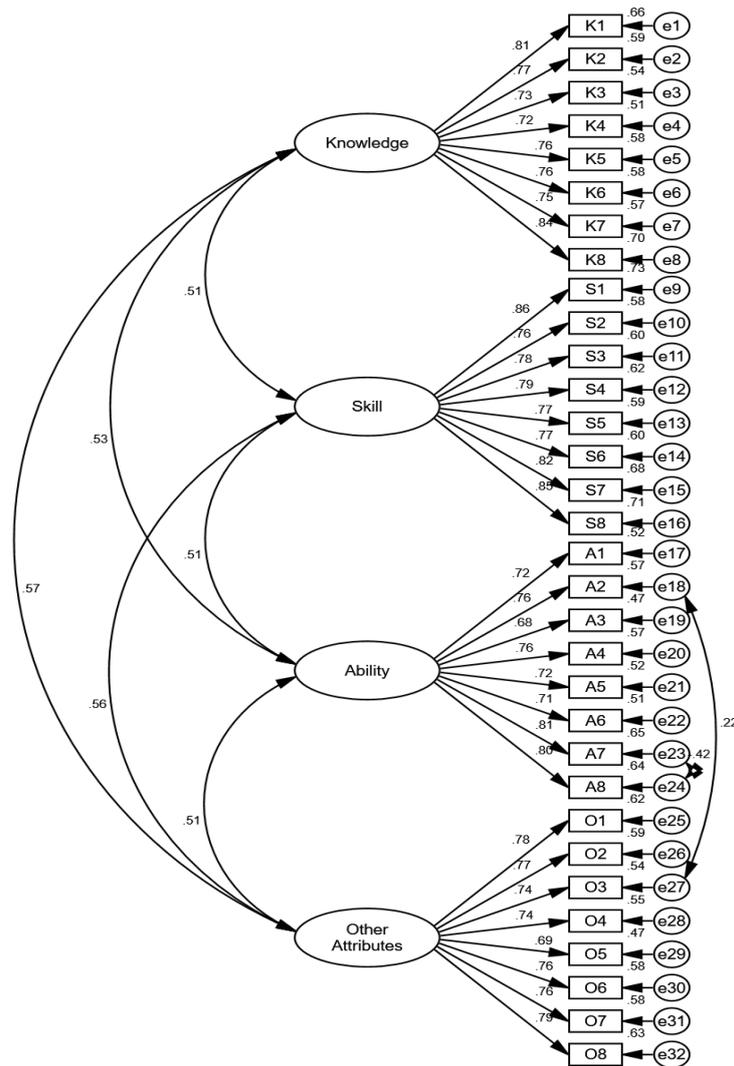


Fig. 1 Diagram of the validity factor model

After the initial composition of the model was completed, the authors conducted a validation factor analysis to validate further the validity of the Employability Structure Scale for Students in Higher Vocational Colleges and Universities. Then, they fitted the simulated data, and the fitting indexes are shown in Table 2.

Table 2 Model fit indicators

| Reference Indicators    | X2/df                | GFI                  | AGFI                 | NFI                  | TLI                  | CFI                  | RMSEA                |
|-------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| statistical value       | 1.267                | 0.915                | 0.901                | 0.926                | 0.982                | 0.983                | 0.027                |
| reference point         | <3                   | >0.9                 | >0.9                 | >0.9                 | >0.9                 | >0.9                 | <0.08                |
| Attainment of standards | reach a set standard |

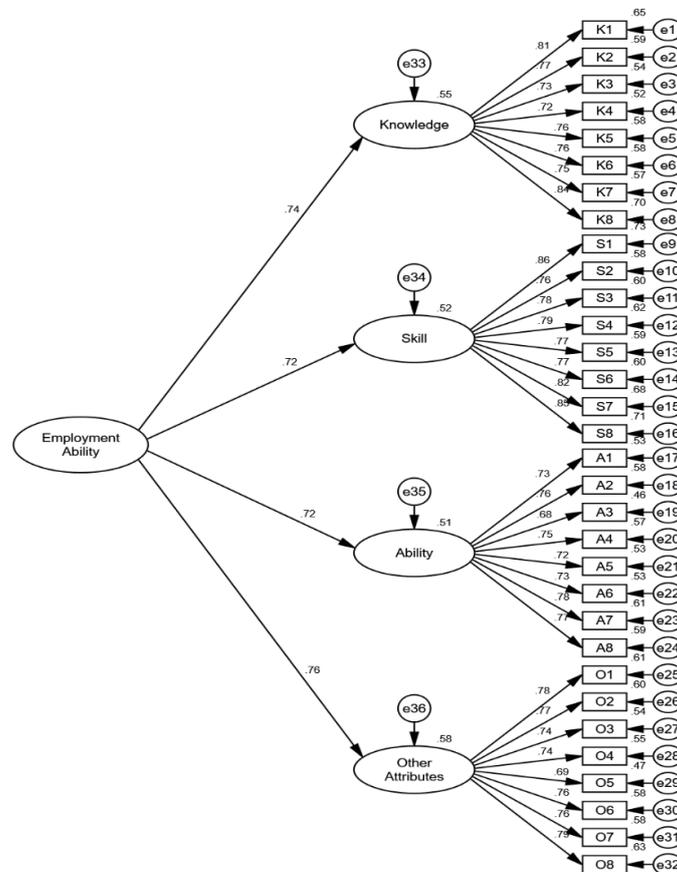
Generally, the ratio of chi-square to degrees of freedom should be greater than one and less than 3, which indicates that the model fit is not good, and less than one indicates that the model fit is excessive; the X2 / df of this paper is 1.267, which is in line with the judgment standard, indicating that the model fit is better, the GFI (goodness of fit index) is the index of the goodness of fit, and AGFI (adjusted goodness of fit index) is the index of the adjusted fit. GFI (goodness of fit index) is the fitness index, AGFI (adjusted goodness of fit index) is the adjusted fitness index, the closer the value of GFI and AGFI is to 1, the higher the fitness of the model is, and the GFI and AGFI of this paper are 0.915 and 0.901 respectively, which indicates that the fitness of this paper is high.

NFI (Normed fit index) is the benchmark fit index; NFI is equal to 1 minus the preset model difference; the smaller the model difference is, the closer the value of NFI is to 1, the better the model fit is. The NFI is usually greater than 0.9, and the NFI of this paper is 0.926, which is in line with the general standard. TLI (tucker-lewis index) is usually between 0 and 1; when the TLI is equal to 1, the data fit the model completely, the general standard is 0.9, and the TLI of this paper is 0.982. CFI (comparative fit index) is the comparative fit index; the NFI equals one minus the difference of the preset models, and the closer the NFI value is to 1, the better the model fit. CFI (comparative fit index) is the comparative fit index; the value is between 0 and 1; when CFI is equal to 1, it means that the data fit the model entirely, the common standard is 0.9, the CFI of this paper is 0.983, which is significantly higher than the standard. RMSEA refers to the asymptotic residual mean squared and square root of the residuals; it is the ratio of the overall difference to the degrees of freedom, usually less than 0.08; the RMSEA of this paper is 0.027. In summary, the validated factor analysis of each item of this paper is asymptotic, and the RMSEA is the ratio between the overall difference and the degrees of freedom. In conclusion, the validation factor analysis of this paper has reached the standard in all indicators, and the model's overall fit is good.

**Table 3** Differential validity analysis

| KSAO             | Knowledge | Skill | Ability | Other Attributes |
|------------------|-----------|-------|---------|------------------|
| Knowledge        | 0.768     |       |         |                  |
| Skill            | 0.513     | 0.799 |         |                  |
| Ability          | 0.529     | 0.511 | 0.746   |                  |
| Other Attributes | 0.569     | 0.565 | 0.507   | 0.755            |

Square root of AVE right oblique upper corner



**Fig.2** Initial second-order validity factor model

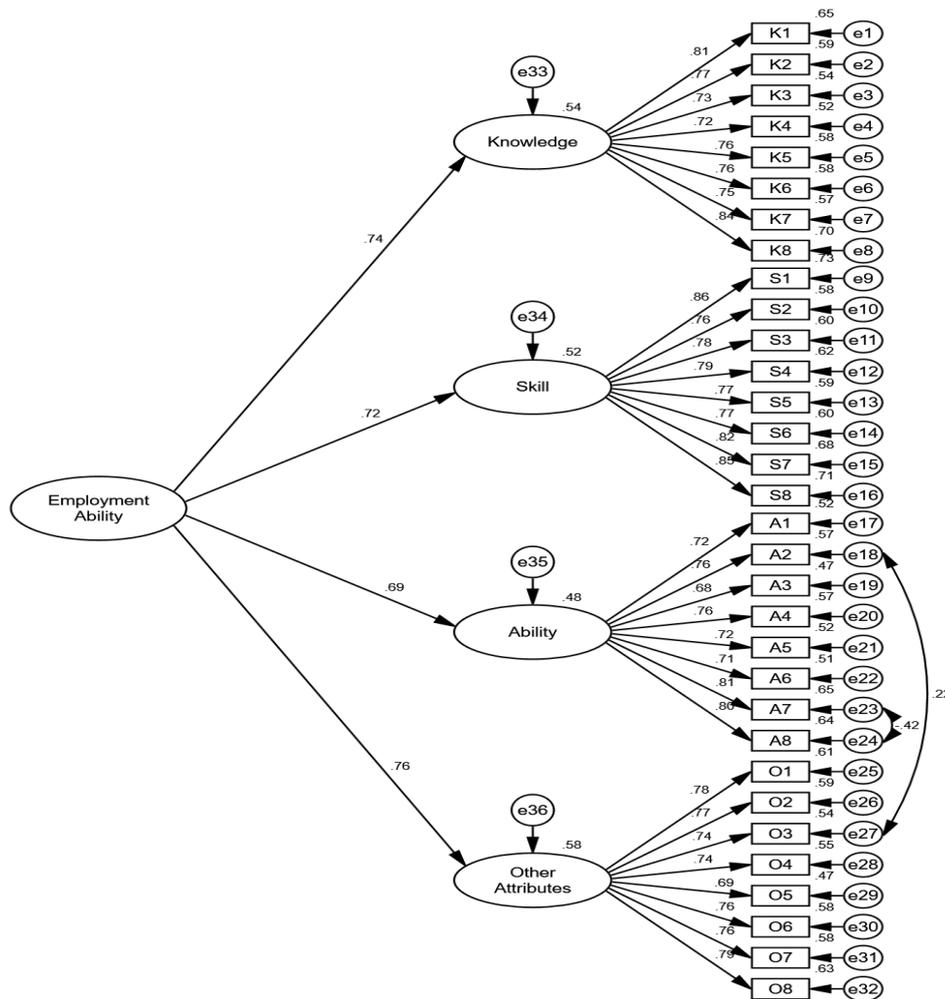
As can be seen from Table 3, the AVE for each dimension is more significant than 0.5, and the square root of the AVE is greater than the correlation coefficient between the dimensions, so it indicates that the scale has good discriminant validity. In judging whether the model is valid, it is mainly measured by the measurement of some fitting indexes, of which  $\chi^2/df$  is generally required to be less than 3, GFI is the fitness index, AGFI is the adjusted

fitness index, NFI gauge fitness index, TLI value-added fitness index, CFI comparative fitness index, and it is generally required that these values are all greater than 0.9, which indicates that the model fit ability is better, but greater than 0.8 The RMSEA should be less than 0.08 indicating better fit and better model fit. From the above Fig.2, it can be seen that the fitting effect is average and needs to be corrected.

**Table 4** Corrected M.I values

|     | Trails |     | M.I.   | Par Change |
|-----|--------|-----|--------|------------|
| e24 | <-->   | e23 | 28.479 | -0.130     |
| e18 | <-->   | e27 | 14.226 | 0.109      |

By looking at the corrective index MI values, it was found that the following residual items have higher corrective index MI values, in a sense indicating that the two measurement question items are somehow related, and an increased correlation needs to be carried out: the corrected model is as follows Table4.



**Fig. 3** Modified model

**Table 5** Model fit indicators

| Targets                 | X2/df                | GFI                  | AGFI                 | NFI                  | TLI                  | CFI                  | RMSEA                |
|-------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| statistical value       | 1.266                | 0.914                | 0.901                | 0.926                | 0.982                | 0.982                | 0.027                |
| reference point         | <3                   | >0.9                 | >0.9                 | >0.9                 | >0.9                 | >0.9                 | <0.08                |
| Attainment of standards | reach a set standard |

According to the criteria of the model fitting indicators, the fitting indicators of the model all meet the requirements, so the model's path is analyzed. From the table,  $X^2/df$  is 1.266, which is less than 3; GFI is 0.914, which is greater than 0.9, AGFI is 0.901, which is greater than 0.9; NFI is 0.926, which is greater than 0.9, CFI and TFI are both greater than 0.9, and RMSEA is 0.027, which is less than 0.08. Convergent Validity (CV) refers to the highly correlated categorization obtained when two different measurement tools are used to measure the same concept (Geng, Pioneer, 2008). In this study, convergent validity was examined by construct reliability (CR) and average variance extracted value (AVE) based on the suggestion of Tyson Rong (2009, p. 145). Construct reliability is usually  $>0.7$  and AVE  $>0.5$  as meeting the criteria.

**Table 6** *Employment ability second-order validation analysis results*

| Latent variables   | Observation variable | Estimate | S.E.  | C.R.  | P   | CR    | AVE   |
|--------------------|----------------------|----------|-------|-------|-----|-------|-------|
| Employment Ability | Knowledge            | 0.738    |       |       |     |       |       |
|                    | Skill                | 0.724    | 0.106 | 9.7   | *** | 0.820 | 0.533 |
|                    | Ability              | 0.694    | 0.086 | 8.828 | *** |       |       |
|                    | Other Attributes     | 0.762    | 0.105 | 9.555 | *** |       |       |

Employment Ability factor loadings, combined reliability (CR), and average variance extracted (AVE) values are shown in the table. The factor loading values of each variable are between 0.7 and 0.8, indicating high convergent validity. The combined reliability (CR) of each dimension is more significant than 0.7 to meet the criterion, and the AVE is more significant than 0.5 to meet the criterion, with a probability of significance of  $P < 0.001$ , which indicates that the structural model of the involvement scale converges very well. It indicates that the second-order model validation is significant.

#### 4. Conclusion

The research scale was applied in this study, and a questionnaire survey was conducted for employers and college graduates. The 367 valid questionnaires were statistically analyzed using SPSS27.0 statistical software, and the results showed that the reliability and validity of the survey scale were good. The structure of college students' employability was analyzed, indicating that their employability consists of a series of indicators with common factors, indicating that college students' employability is hierarchical and that their ability indicators have an intrinsic structure among each other. The five-dimensional ability as a theoretical hypothesis model, using AMOS27.0 software, through the structural equation modeling was tested, indicating that the structural model of college students' employability is a good fit and the model is valid.

Despite the robust methodology, this study has several limitations:

- The sample was limited to finance graduates in Guangdong Province, which may only partially represent the diversity of higher vocational graduates across different regions and disciplines. This limitation affects the generalizability of the findings.
- The sample size, while adequate, could be expanded in future studies to enhance the robustness of the results.
- Potential biases may have arisen from the self-reported nature of the survey data, which could affect the accuracy of the findings.

Based on the findings and limitations of this study, several recommendations for future research are proposed: (1) Expand the Sample Size and Scope: Future studies should include a more extensive and diverse sample, encompassing graduates from various disciplines and regions. This direction would enhance the generalizability of the findings and provide a more comprehensive understanding of employability competencies; (2) Longitudinal Studies: Conducting longitudinal studies would provide insights into how employability competencies evolve and the long-term impact of educational interventions on graduate employability; (3) Qualitative Research: Incorporating qualitative methods, such as interviews and focus groups, could provide deeper insights into the specific competencies valued by employers and the contextual factors influencing employability; (4) Interdisciplinary Approaches: Future research should explore interdisciplinary training programs that integrate various competencies, addressing the need for a more holistic skill set as indicated by the high correlation between specific competencies in this study.

In conclusion, this study contributes to understanding employability competencies from both graduate and employer perspectives. The validated five-dimensional model offers a framework for developing targeted educational programs that align with employer needs, ultimately enhancing the employability of higher vocational graduates.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

The authors confirm contribution to the paper as follows: study conception and design: Zheng, J.H. and Lee, M.F.; data collection: Zheng, J.H.; analysis and interpretation of results: Zheng, J.H. and Lee, M.F.; draft manuscript preparation: Zheng, J.H.; proofread and review manuscript: Lee, M.F. All authors reviewed the results and approved the final version of the manuscript.

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