POLICY OF COMMON COMPETENCY ASSESSMENT IN TAIWAN'S HIGHER EDUCATION AND ITS APPLICATION IN UNIVERSITY AFFAIRS DATA

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Abstract:
This study focus on the competency assessments conducted through the University Career and Competency Assessment Network (UCAN), a platform widely utilized in Taiwan's higher education system. Using a private university in Taiwan as a case study, the research tracked cohorts of students who enrolled between the 2018 and 2021 academic years. UCAN assessments were administered as pre-tests during the students' first year and post-tests in their third year to measure changes in their common competencies. Institutional data obtained from these assessments were analyzed using one-way ANCOVA and independent sample t-tests to explore the impact of the Higher Education Sprout Project, which emphasizes innovative teaching, on students' competency development. The results from the longitudinal analysis reveal significant improvements in all eight core competencies, with the most notable self-efficacy gains observed in communication, problem-solving, and information technology skills.

Keywords: one-way ANCOVA, independent samples t-test, communication, problem-solving, information technology

1. Introduction

According to Yang (2012), competency primarily refers to the abilities required to achieve high-performance work, encompassing the knowledge, skills, and abilities needed in industries, professions, or job roles. The concept of competency was first introduced in the 1970s by Harvard University psychologist McClelland (1973), who argued that job performance is determined by a worker's "*attitude, cognition, and traits,*" laying the foundation for the concept of competency. Spencer & Spencer (1993) further developed the well-known Iceberg Theory, which defines competency as the critical personal characteristics that predict high job performance. They noted that competency consists of

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both explicit knowledge and skills (the visible part of the iceberg) and implicit elements like self-concept, personality traits, and motivation (the submerged part of the iceberg that is harder to discern). Mirable (1997) also contributed to this concept, highlighting the importance of personality traits in competency. Darrell & Ellen (1998) categorized competencies into four main types: core competencies, functional competencies, role competencies, and task competencies. They defined core competencies as the common skills required by all employees, typically aligned with organizational vision and values and reflective of organizational culture. Functional competencies refer to the skills needed by employees in different departments (such as marketing, R&D, finance, etc.), while role competencies pertain to the capabilities required for specific organizational roles (such as managers, engineers, technicians, secretaries, etc.). Task competencies relate to the skills employees need to perform their specific jobs. Zwell & Ressler (2000) further identified three critical competencies for achieving high job performance: common key competencies, managerial competencies, and senior management competencies.

In 2010, Taiwan's Ministry of Education established the University Career and Competency Assessment Network (UCAN) to help college students better understand their career development during their studies and enhance their abilities to adapt to the rapidly changing job market. UCAN primarily offers assessments and analyses, such as career interest and competency diagnostics. The competency diagnostics are based on the Iceberg Theory and differentiate between "*workplace generic Competencies*" and "*professional competencies*." According to Lin (2007), the essential employability skills for young people include foundational employability skills, knowledge application skills, academic expertise, teamwork skills, and career planning skills. These categories are interrelated, meaning that both professional competencies, such as academic expertise and knowledge application, and Generic Competencies, like foundational employability skills, teamwork, and career planning, are critical indicators of employability in higher education (Tsai, 2014).

In conclusion, the goal of higher education in aligning academic learning with practical application involves not only transforming students' professional skills into workplace competencies but also developing the Generic Competencies required in the workplace during their academic years. At the University, since the Ministry of Education funded the Higher Education Sprout Project in 2018, more than 50% of the allocated funds have been invested in teaching innovation. Funding has been used to enhance teachers' capacity for innovative and AI-integrated teaching, and to improve students' narrative expression, English proficiency, information technology skills, and problem-solving abilities for future challenges. Therefore, the study aims to examine the use of funding by a private university in Taiwan during the Higher Education Sprout Project and assess the impact of financial support on students' self-efficacy in common competencies. Furthermore, it explores how Taiwan's higher education has implemented institutional policies for teaching innovation and achieved its goal of integrating academic learning with practical application.

2. Literature Review

According to Yorke & Knight (2006), employability is defined as "*a set of achievements—skills, understandings, and personal attributes—that make graduates more likely to gain employment and be successful in their chosen occupations.*" Broadly speaking, Chou (2011) asserts that employability should encompass both professional and foundational skills. With the evolving trends in higher education, in order to cultivate modern citizens who can play active and proactive roles in the knowledge-based economy, knowledge, skills, traits, attitudes, and abilities are considered essential components of employability (Cranmer, 2006; Forbes & Ripmeester, 2011). Wu (2012) noted that while the definition of employability varies across countries, the core competencies required for university graduates' employability have commonalities. These core competencies represent the shared expectations that businesses have for workers' traits or abilities, serving as the foundation for supporting professional competency development. In light of this, Taiwan's Ministry of Education established the "University Career and Competency Assessment Network" (UCAN) in 2010. UCAN is designed to align with industry competency requirements, providing a reference framework for university students to conduct self-assessments, plan their competencies, and enhance their competitiveness in the job market (Pan et al., 2014).

The UCAN platform's assessment is divided into three major sections: the first section focuses on career interest exploration, and the second section on competency diagnostics. The career interest exploration section is based on John Holland's vocational interest theory, proposed in 1990. According to Zhang (2006), this theory classifies vocations into six personality-based interest types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional, which can be further analyzed through a hexagonal model. In the competency diagnostic section, there are two types: common competency diagnostics and professional competency diagnostics. Professional competencies refer to the specific expertise required for various job types, while Generic Competencies refer to the skills needed across different occupations. The common competency scale is assessed through subjective self-evaluation, where individuals rate their competency levels in eight key areas: "*communication and expression," "continuous learning," "interpersonal interaction," "teamwork," "problem-solving," "innovation," "work responsibility and discipline," and "information technology and application*" (Wang, 2018).

According to Ma et al. (2022), self-efficacy has a significant positive correlation with job satisfaction and job performance. Therefore, the self-efficacy assessed through the UCAN evaluation may help individuals conduct a preliminary assessment of their future job performance. Additionally, it could serve as a reference indicator for higher education institutions in talent development.

3. Material and Methods

The questionnaire used in this study is primarily based on the Common Competency Questionnaire from the UCAN platform. The questionnaire covers eight key competencies: communication and expression, continuous learning, interpersonal interaction, teamwork, problem-solving, innovation, work responsibility and discipline, and information technology and application. Each dimension is represented by 6-8 related questions. Respondents answer the questionnaire based on their self-efficacy, using a five-point Likert scale for their responses. The questionnaire items are detailed in Table 1. Additionally, the reliability of the questionnaire ranges from 0.861 to 0.922 for usage reliability and from 0.858 to 0.907 for importance reliability, indicating good content validity and high consensus (Luo, 2017).

By tracking the UCAN pre- and post-assessments of students admitted in the 2018, 2019, 2020, and 2021 academic years at a private university, this study analyzes their competency development. The pre-tests were uniformly administered during the students' first year of enrollment, while the post-tests were conducted two years after their enrollment. Specifically, the UCAN post-test for students admitted in the 2018 academic year was conducted in 2020; for those admitted in 2019, the post-test was in 2021; for the 2020 cohort, it was in 2022; and for the 2021 cohort, it will be conducted in 2023. Details on the testing periods and sample sizes for both pre- and post-assessments are provided in Table 1.

The study conducted pre- and post-tests using the UCAN Common Competency assessment, tracking students who enrolled in the academic years 2018, 2019, 2020, and 2021 (107, 108, 109, and 110 academic years[ii]). The pre-tests were administered uniformly upon students' entry into the university, while the post-tests were conducted two years after their enrollment. Therefore, the post-test for students who enrolled in the 2018 academic year (107 academic years) was conducted in 2020 (109 academic years), the post-test for the 2019 (108 academic years) cohort was conducted in 2021 (110 academic years), the 2020 (109 academic years) cohort in 2022 (111 academic years), and the 2021 (110 academic years) cohort will have their post-test conducted in 2023 (112 academic years). The testing times and sample sizes for both the pre-test and post-test across each academic year are detailed in Table 2.

This study tracked the UCAN pre- and post-tests of students enrolled in the 107th to 110th academic years, with a total of 6,484 students being followed. The descriptive statistics for the responses to the related questionnaires are detailed in Table 3.

[ii] In Taiwan, an academic year spans from August 1 of the current year to July 31 of the following year. For example, the 2018 academic year refers to the period from August 1, 2018, to July 31, 2019, and so forth.

4. Results and Discussion

4.1 Analysis of Covariance (ANCOVA)

Lin (2017) pointed out that the OECD report revealed that men tend to have weaker reading skills, while women often fear mathematics, possibly due to gender stereotypes. In the literature, Oswald & Harvey (2003) found that women are less likely than men to choose courses and careers in mathematics and science. In Taiwan, there are indeed some cognitive differences based on stereotypes, such as the traditional belief that men are better at math and thus suited for STEM fields, while women are considered better at writing and more suited for the humanities. These stereotypes have a deep, long-term influence on both parents and children. As a result, in this study, gender differences in self-efficacy may arise in the UCAN common competency assessments. Therefore, ANCOVA was used to test for differences between the pre-test and gender.

The results of the ANCOVA analysis are detailed in Table 4. From the interaction effects of gender shown in Table 3, it was found that only the innovation competency had a significant interaction effect. This indicates that there may be systematic gender bias in the pre- and post-tests for innovation competency, which could lead to potential bias in the study's results. However, for the other seven competencies, no significant interaction effects were observed, meaning that no systematic gender bias exists in these areas. Furthermore, the pre- and post-test differences for these seven competencies were statistically significant.

4.2 Independent Samples T-Test

In this study, the independent samples T-test was employed to further analyze each student's pre- and post-test data. This statistical method was used to examine the impact of the university's teaching innovation initiatives, implemented under the Ministry of Education's Higher Education Sprout Project, on changes in students' eight core competencies. The empirical results are detailed in Table 5.

The results indicate that, following the financial support from the Higher Education Sprout Project, the university's efforts to enhance students' competencies in narrative skills, information technology, and autonomous learning—through curriculum adjustments, innovative teaching methods, career-oriented programs, and interdisciplinary courses—have led to significant positive improvements in all eight core competencies across the student body. Among these, the competencies related to communication and expression, problem-solving, and information technology saw the greatest improvements, demonstrating the effectiveness of the university's educational initiatives.

The data was further divided by colleges, and the independent samples T-test was conducted to examine the impact of these initiatives on the eight core competencies for students in each college. The empirical results are summarized in Table 6.

The results reveal that students from the College of Science, College of Business, and College of Education showed significant positive improvements across all eight core

competencies, thanks to curriculum adjustments, innovative teaching methods, and the implementation of career and interdisciplinary programs. While students from the College of Engineering, College of Electrical Engineering and Computer Science, and College of Design also experienced positive impacts across competencies, the College of Engineering did not show a significant improvement in continuous learning. Similarly, the College of Design did not demonstrate significant improvements in continuous learning, work responsibility, or discipline. As for the College of Law, significant positive effects were observed in the competencies related to problem-solving and information technology application.

The data was further divided by gender, and the independent samples T-test was conducted to analyze the impact of gender on the changes in the eight core competencies. The empirical results are summarized in Table 7.

5. Conclusion

According to the ManpowerGroup Global Employment Outlook Survey (2024) [iii], Taiwan's top three industries with the highest employment demand are "Healthcare and Life Sciences," "Transportation, Logistics, and Automotive," and "Industrial and Materials." Conversely, the "Energy and Utilities" sector has the lowest demand. This is a shift from the 2023 report [iv], where "Energy and Utilities" and "Other Services" ranked higher, while "Healthcare and Life Sciences" remained consistent. A comparison with the 2022 report also reveals a change, with the top three industries being "Finance, Insurance, and Real Estate," "Information and Communication Technology (including publishing and media)," and "Other Services." [v] These fluctuations demonstrate Taiwan's rapidly changing job market, which adapts to environmental shifts. Consequently, higher education institutions must focus not only on fostering professional skills but also on developing adaptable employability competencies that align with market dynamics.

This study targets students enrolled between the 2018 and 2021 academic years at a private university in Taiwan, utilizing data from their UCAN pre- and post-assessments conducted during their first and third years. The research examines changes in students' self-efficacy across eight core competencies: communication, lifelong learning, interpersonal interaction, teamwork, problem-solving, innovation, work responsibility and discipline, and information technology application. The goal is to assess whether the teaching and counseling measures provided by the university during their studies have effectively enhanced their employability competencies.

Using SPSS for statistical analysis, the study's ANCOVA results indicate that all eight competencies, except for innovation (which was influenced by gender-related bias), align with randomness. The analysis shows significant self-efficacy differences for students in response to the university's teaching and guidance measures. Additionally,

[iii] https://www.cna.com.tw/postwrite/chi/372784

[iv] https://www.manpowergrc.tw/index.php?route=newsblog/article&article_id=641

[v] https://www.manpowergrc.tw/index.php?route=newsblog/article&article_id=598

the independent samples T-test reveals significant positive self-efficacy changes across all eight competencies, with the most notable improvements in communication, problem-solving, and information technology.

When analyzed by college, students from the College of Science, College of Electrical Engineering and Computer Science, College of Business, and College of Education demonstrated the best outcomes across the eight competencies. A gender-based analysis further reveals that female students exhibited greater improvements in information technology than their male counterparts.

Since the launch of the Higher Education Sprout Project by Taiwan's Ministry of Education, seven years have passed. The private university selected for this study has consistently received the highest level of funding, allocating over 50% of its budget each year to teaching innovation. This research tracked four consecutive cohorts of students admitted during the years the university received funding, utilizing UCAN pre- and post-assessments for institutional research. The findings indicate that the financial support from the Higher Education Sprout Project has significantly and positively enhanced students' self-efficacy in common workplace competencies, with the greatest improvements observed in communication, problem-solving, and information technology skills.

Based on these findings, the following measures are recommended to enhance common competencies in communication, problem-solving, and information technology through resource investment in teaching innovation:

A. Enhancing Communication Skills: The selected university can strengthen students' communication competencies through a four-year narrative course plan, which includes foundational narrative expression courses in the first year, problem-based teaching integrated into courses in the second and third years, and a capstone project course in the fourth year. This approach ensures continuous training in communication throughout their studies.

B. Enhancing Information Technology Skills: The selected university can bolster students' IT competencies through a four-year curriculum focused on AI and programming. This plan should include courses on computational thinking, programming, and AI introduction in the first year; integrated programming language courses in the second and third years; and a capstone project course in the fourth year. Such a curriculum provides consistent training in information technology over four years.

C. Enhancing Problem-Solving Skills: The selected university can improve students' problem-solving competencies through a structured four-year problem-solving course plan, which should incorporate introductory university courses in the first year, advanced courses and career-focused curricula in the second and third years, and workplace internships or enterprise project courses in the fourth year. This ensures that students receive ongoing problem-solving training throughout their studies.

D. Encourage teachers to apply for the Ministry of Education's Teaching Practice Research Program in Taiwan. Through this program, teachers must propose innovative teaching measures and implement related operational methods in the classroom. By recording quantitative indicators such as students' learning motivation, attitudes, and performance, teachers can continuously adjust and improve their teaching strategies in real time, thereby significantly enhancing students' employment competencies.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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References

Chou C, 2011. Theory and practice of technical and vocational education: From the perspective of excellence. Taichung City, Taiwan.

Cranmer S, 2006. Enhancing graduate employability: Best intentions and mixed outcomes. Studies in Higher Education, 31(2): 169-184. https://doi.org/10.1080/03075070600572041

Darrell J, Ellen R, 1998. Competency-Based Pay: A Concept in Evolution. Compensation & Benefit Review, Saranac Lake, 30(5): 21-28. https://doi.org/10.1177/088636879803000505

Lin, H, 2017. The negative impact of gender stereotypes on male and female students' learning and coping strategies. Educational Pulse, 9, 91–93.

Lin Y, 2007. A study on the relationship between basic competencies and the enhancement of employability: A case study of adolescents in the central region. Master's thesis, Dayeh University.

Luo, W, 2017. Introduction to the UCAN platform. https://reurl.cc/934l3Y.

Ma K, Tian H, Zheng Y, Wei X, Guo Y, Guo Z, Su Y, Guo, Y, 2022. The effect of occupational self-efficacy on job performance: Job satisfaction as a mediator. Management Information Computing, 11(2), 74–83. http://dx.doi.org/10.1108/MRR-03-2017-0062

McClelland D, 1973. Testing for competence rather than for intelligence. American Psychologist, 28(1): 1-24. http://dx.doi.org/10.1037/h0034092

Mirable R, 1997. Everything you wanted to know about competency modeling. Training and Development, 51(8): 73-77. Retrieved from

https://go.gale.com/ps/i.do?id=GALE%7CA20021823&sid=googleScholar&v=2.1
&it=r&linkaccess=fulltext&issn=10559760&p=AONE&sw=w

Pan Y, Li C, Huang L, 2014. The performance of common competencies among university of technology students and its implications for curriculum mapping. Curriculum & Instruction Quarterly, 17(3), 39–60.

Spencer L, Spencer S, 1993. Competence at Work: Models for Superior Performance. New York, USA. Retrieved from https://www.wiley.com/en-us/Competence+at+Work%3A+Models+for+Superior+Performance-p-9780471548096

Tsai C, 2014. A study on the employability of curriculum in Taiwan's higher technical and vocational education: A case study of tourism and leisure programs in universities. PhD thesis, National Pingtung University.

Wang S, 2018. A Study on Latent Growth Model of UCAN Common Competency Self-Evaluation- A Case of M University. Master thesis, Ming Chuan University. Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22106MCU00337012%22.&searchmode=basic

Wu Z, 2012. An exploration of the employment ability, employment competencies, and workplace skills of college youth. Contemporary Educational Research, 20(2), 1–45. http://dx.doi.org/10.1504/IJWOE.2018.10012435

Yang, Y.J. (2012). Competency analysis and the construction of competency models. Retrieved from https://reurl.cc/GpA1Ny.

Yorke M, Knight, P, 2006. Embedding employability into the curriculum. York, UK. Retrieved from https://www.qualityresearchinternational.com/esecttools/esectpubs/Embedding%20employability%20into%20the%20curriculum.pdf

Zhang Z, 2006. A study on the relationship between personality traits, job fit, and customer satisfaction: A case study of the automotive repair industry. Master's thesis, National Sun Yat-sen University.

Zwell M, Ressler R, 2000, Powering the human drivers of financial performance. Strategic Finance, 81(11): 40-45. Retrieved from https://go.gale.com/ps/i.do?id=GALE%7CA62870783&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=1524833X&p=AONE&sw=w&userGroupName=rst58&aty=ip

Appendix

Table 1: Administered Questionnaire

Generic Competencies		Questionnaires
Communication and Expression	A1	When talking with others at work, I first confirm the topic and purpose of the conversation.
	A2	I focus on listening to and observing the messages conveyed by others, even if their opinions differ from mine, and I remain open to hearing them.
	A3	I tailor my communication style and techniques to suit different audiences, clearly expressing messages and engaging in dialogue.
	A4	I can accurately interpret work-related documents, such as written materials, charts, technical documents, and test reports.
	A5	I use correct grammar, formatting, and logic to create written content that meets the organization's or job's requirements.
	A6	I can effectively convey messages in writing to different audiences.
	A7	I utilize foreign language skills required by the organization or job to communicate information.
Lifelong Learning	B1	I consistently exhibit curiosity about learning new things, knowledge, and skills.
	B2	I clearly understand the knowledge, skills, and qualifications needed for my career development.
	B3	I set specific goals for my personal skill development.
	B4	I recognize the importance of continuous learning and training for career growth.
	B5	I actively develop my professional abilities in response to industry trends.
	B6	I draw positive and beneficial experiences from interacting with others.
	B7	I continuously apply various methods and channels to enhance my abilities.
Interpersonal Interaction	C1	I empathize with others, understanding their needs and feelings, and build positive relationships.
	C2	I analyze my field and proactively identify key relationships to establish or improve.
	C3	I seek or create opportunities to connect with others and expand my network.
	C4	I express goodwill to those who can provide information or assistance at work.
	C5	I offer help and support to others, fostering mutually beneficial relationships for future cooperation.
	C6	I systematically manage my network resources using appropriate methods.
Teamwork	D1	I prioritize the team's goals and support its decisions.
	D2	I actively participate in the team and sincerely express my views.
	D3	I provide constructive feedback on team members' ideas.
	D4	I respect and learn from the opinions and expertise of team members.
	D5	I speak positively about team members and avoid criticism behind their backs.
	D6	I adjust my role or behavior as needed, setting aside personal preferences.
	D7	I collaborate with team members to solve problems and take responsibility for outcomes.
Problem	E1	I systematically gather information related to the situation.

Generic Competencies		Questionnaires
Solving	E2	I carefully assess facts and evidence to make reasonable judgments about potential issues.
	E3	I use structured approaches to clarify problems.
	E4	I collect data and opinions through various channels to offer multiple solutions.
	E5	I evaluate the pros and cons of different solutions to identify the best one.
	E6	I prepare in advance for potential problems by identifying the necessary information.
Innovation	F1	I assess existing methods and suggest improvements to streamline services, systems, or processes.
	F2	I explore new ways to achieve goals or solve problems instead of being confined to existing practices.
	F3	I collect, analyze, and organize diverse opinions to propose novel perspectives.
	F4	I generate innovative and feasible ideas for products or services.
	F5	I anticipate and predict potential new trends and developments.
	F6	I maintain flexibility during tasks.
Work Responsibility and Discipline	G1	I align with the organization's goals or values and actively work toward its benefit.
	G2	I understand and diligently complete my assigned tasks, ensuring quality outcomes.
	G3	I follow the organization's rules, procedures, and work standards.
	G4	I ensure personal safety and maintain physical and mental well-being.
	G5	I find suitable ways to relieve stress and face challenges with courage.
	G6	I follow organizational ethics and maintain reasonable interactions with departments and personnel.
	G7	I act with integrity and understand the consequences of violating ethical or legal standards, ensuring responsibility and discipline in daily work performance.
Information Technology Application	H1	I use appropriate IT tools according to different situations to complete tasks efficiently.
	H2	I browse and search for information online, filtering and managing data effectively.
	H3	I produce digital content (e.g., text, photos, videos) that meets organizational or job requirements using IT tools.
	H4	I communicate and interact with others through suitable IT tools based on different situations.
	H5	I understand copyright and licensing rules for using information or digital content.
	H6	I recognize risks and threats in the digital environment and take appropriate measures to protect personal data and device security.
	H7	I solve problems or find solutions through IT tools.
	H8	I integrate industry knowledge with IT tools to enhance work tasks.

Source: Compiled from the UCAN platform (https://ucan.moe.edu.tw/).

Table 2: Testing Schedule and Number of Valid Samples

Academic Year of Enrollment	Pre-test	Post-test	Valid Sample Size
107	2018/09-2019/02	2020/09-2021/02	1,653
108	2019/09-2020/02	2021/09-2022/02	1,779
109	2020/09-2021/02	2022/09-2023/02	1,501
110	2021/09-2021/02	2023/09-2024/06	1,551
Total			6,484

Source: Compiled by the authors of this study.

Table 3: Descriptive Statistics for UCAN Testing

Generic Competencies	Pre-test		Post-test	
	Mean	Standard Deviation	Mean	Standard Deviation
Communication and Expression	3.74	0.56	3.92	0.55
Lifelong Learning	3.79	0.60	3.84	0.62
Interpersonal Interaction	3.96	0.64	4.03	0.63
Teamwork	3.99	0.60	4.11	0.56
Problem Solving	3.79	0.61	3.96	0.60
Innovation	3.68	0.66	3.81	0.64
Work Responsibility and Discipline	4.10	0.59	4.17	0.58
Information Technology Application	3.80	0.64	3.98	0.61

Source: Compiled by the authors of this study.

Table 4: One-Way Analysis of Covariance (ANCOVA)

	Sum of Squares	Interaction Effect	R^2
Communication and Expression	367.08***	0.029	0.191
Lifelong Learning	433.409***	0.022	0.172
Interpersonal Interaction	481.292***	0.041	0.191
Teamwork	307.03***	0.285	0.156
Problem Solving	373.19***	0.69	0.163
Innovation	509.278***	1.419**	0.194
Work Responsibility and Discipline	296.638***	0.555	0.151
Information Technology Application	364.984***	0.002	0.147

Note: $*p<0.1$、$**p<0.05$、$***p<0.01$
Source: Compiled by the authors of this study.

Table 5: Results of Independent Samples T-Test for the Entire School

Generic Competencies	Mean Difference Score	Standard Deviation	T Statistics	p value
Communication and Expression	0.18	0.59	24.49	0.000
Lifelong Learning	0.05	0.67	6.29	0.000
Interpersonal Interaction	0.07	0.67	8.16	0.000
Teamwork	0.12	0.64	15.27	0.000
Problem Solving	0.17	0.66	20.95	0.000
Innovation	0.13	0.69	14.84	0.000
Work Responsibility and Discipline	0.07	0.65	8.18	0.000
Information Technology Application	0.18	0.69	21.06	0.000

Source: Compiled by the authors of this study.

Table 6: Results of Independent Samples T-Test by College

Generic Competencies	Colleges						
	Science	Engineering	Electrical Engineering and Computer Science	Business	Design	Humanities and Education	Law
	N = 1,166	N = 1,365	N = 1,134	N = 1,657	N = 491	N = 471	N = 200
Communication and Expression	0.17***	0.17***	0.18***	0.20***	0.16***	0.23***	0.09
Lifelong Learning	0.06***	0.02	0.03	0.09***	0.03	0.10***	0.01
Interpersonal Interaction	0.10***	0.05**	0.08***	0.07***	0.05*	0.06*	-0.01
Teamwork	0.13***	0.10***	0.14***	0.15***	0.07**	0.11***	0.01
Problem Solving	0.18***	0.14***	0.14***	0.19***	0.16***	0.29***	0.16**
Innovation	0.16***	0.09***	0.11***	0.15***	0.06*	0.20***	0.07
Work Responsibility and Discipline	0.08***	0.05**	0.05***	0.10***	0.01	0.08***	0.01
Information Technology Application	0.17***	0.13***	0.13***	0.21***	0.22***	0.34***	0.22***

Note: *$p<0.1$、**$p<0.05$、***$p<0.01$

Source: Compiled by the authors of this study.

Table 7: Results of Independent Samples T-Test by College

Generic Competencies	Male	Female
	N = 3002	N = 3482
Communication and Expression	0.18***	0.18***
Lifelong Learning	0.04***	0.06***
Interpersonal Interaction	0.08***	0.06***
Teamwork	0.13***	0.11***
Problem Solving	0.17***	0.18***
Innovation	0.13***	0.13***
Work Responsibility and Discipline	0.07***	0.07***
Information Technology Application	0.15***	0.21***

Note: *$p<0.1$、**$p<0.05$、***$p<0.01$

Source: Compiled by the authors of this study.