

Abstract

This study investigated the career orientation and professional identity of vocational college students in selected institutions in China, aiming to develop a comprehensive career plan tailored to their needs. Employing a descriptive correlative design, data were collected via questionnaires from 300 participants, including freshmen to junior-level students and graduates with work experience, from Quanzhou Huaguang Vocational College and Quanzhou Qinggong Vocational College. This paper described the profile of the identified students in terms of sex, age, and major; determined the career orientation of the students in terms of autonomy independence, security stability, lifestyle, and technical function; identified the professional identify of the respondents in terms of affirmation, in-depth exploration, practice, identification with commitment, and reconsideration with commitment; tested the significant differences in the responses when grouped according to profile variables; and tested the significant relationships between career orientation and professional identify. Results revealed that majority of the vocational college students in China affirmed that the following career orientation sub-domains are often true to them: lifestyle also security and stability as the highest, while technical function and general managerial competence as the lowest. They agreed on the following professional identification having reconsideration with commitment as the highest and affirmation as the lowest. Hence, the researcher proposed a career development plan for vocational college students.

Keywords: career orientation, professional identity, vocational colleges

Career orientation and professional identity of vocational college students in China: Basis for career development plan

1. Introduction

In today's rapidly changing global economy, vocational college students' career orientation and professional identity are pivotal in shaping their future prospects and contributing to the workforce. Higher vocational education prioritizes practical skills, catering to industry demands and enabling students to adapt swiftly to professional environments. This emphasis on practical training equips students with necessary skills, enhancing their competitiveness in the job market. Additionally, the shorter duration of vocational college programs aligns with the need for quick career entry among students. Understanding these dynamics is crucial for developing effective career plans that meet both individual aspirations and market needs. This study aims to explore career orientation and professional identity among Chinese vocational college students, providing insights for tailored career guidance programs. On a macro perspective, the landscape of career development has witnessed significant shifts in recent years, driven by globalization, technological advancements, and changing labor market dynamics. Traditional career paths are giving way to more diverse and dynamic options, characterized by the rise of the gig economy, remote work opportunities, and the increasing demand for specialized skills. Moreover, the ongoing Fourth Industrial Revolution is reshaping industries and job roles, emphasizing the importance of adaptability and continuous learning.

As such, there is a constant need for re- or up-skilling for many workers worldwide. However, amidst these transformative trends, challenges persist, particularly concerning the mismatch between the skills possessed by graduates and the requirements of employers. This phenomenon, often referred to as the "skills gap," underscores the importance of equipping students with not only technical competencies but also soft skills and a strong sense of professional identity. Moreover, factors such as socio-economic disparities, gender biases, and cultural influences further complicate the career development landscape, necessitating a nuanced approach to address these complexities. Zooming into the local context of China, the country's rapid economic growth and industrial transformation have created both opportunities and challenges for vocational college students. While the demand for skilled labor remains high in sectors such as manufacturing, technology, and services, the evolving nature of these industries requires students to possess up-to-date skills and a clear understanding of their career aspirations. However, the traditional emphasis on academic achievements and standardized testing in China's education system has sometimes overlooked the importance of vocational education and career guidance.

This study delved into the critical aspects of career orientation and professional identity among vocational college students. Career orientation encompasses individuals' attitudes, preferences, and goals concerning their future career paths, while professional identity involves the sense of belonging, competence, and purpose associated with chosen professions. Career planning, incorporating career orientation, practical training skills, and professional identity, is emphasized as a crucial and continuous process shaping one's life course. It serves as the core of school internship guidance and teaching, influencing students' professional identity formation and guiding their career trajectories. Professional identity, a psychological construct influenced by both individual perspectives and social inputs, reflects individuals' alignment with societal views and expectations regarding their chosen careers. This study highlights the dynamic interplay between personal values, interests, and capabilities in shaping professional identity, underscoring its significance in career development and vocational education. Statistics reveal significant challenges in the career landscape for Chinese vocational college students, with 45% of enterprises struggling to find suitable employees and 50% unable to secure fitting jobs. Moreover, only 3% of fresh graduates achieve their desired roles in party and government organizations, highlighting a discrepancy between career aspirations and reality. Issues such as unclear career orientation, inadequate career planning skills, and a gap between majors and market demands contribute to students' competitive pressures

during job searches. Insufficient investment in career guidance exacerbates these challenges, leaving students without necessary support. Addressing these issues necessitates collaboration between educational institutions, businesses, and students. Strengthening professional curricula, fostering industry partnerships for practical experiences, and enhancing career planning and guidance services are crucial steps toward aligning students' career paths with market demands and fostering successful career development.

This study mainly explored the career orientation and professional identity of Chinese vocational college students and proposed a career development plan for them in selected colleges in China. Understanding the career orientation and professional identity of vocational college students is essential for several reasons. Firstly, it enables educational institutions and policymakers to tailor curriculum offerings, career counseling services, and internship opportunities to better meet students' needs and aspirations. Secondly, it helps bridge the gap between academic training and industry requirements, thereby enhancing graduates' employability and job satisfaction. Lastly, fostering a strong sense of professional identity, individuals are more likely to pursue fulfilling careers aligned with their values and strengths, contributing to their personal growth and overall well-being.

The findings of this study are expected to provide actionable insights for various stakeholders involved in the career development process, including vocational colleges, employers, policymakers, and students themselves. By identifying patterns, challenges, and opportunities related to career orientation and professional identity, this paper aimed to inform the development of evidence-based strategies and programs that empower vocational college students to navigate their career paths successfully. Ultimately, its goal is to contribute to the cultivation of a skilled, motivated, and resilient workforce that drives China's continued economic growth and social development.

Objectives of the Study - This study aimed to explore the career orientation and professional identity of Chinese vocational college students in selected vocational colleges in China, and consequently develop a career plan for the students. More specifically, determined the career orientation of the students in terms of autonomy independence, security stability, lifestyle, and technical function; assessed the professional identify of the respondents in terms of affirmation, in-depth exploration, practice, identification with commitment, and reconsideration with commitment; tested the significant relationships among variables career orientation and professional identify, and lastly, proposed a career development plan based on the results of the study.

2. Methods

Research Design - This study used descriptive correlative design to determine the current situation of career orientation and professional identity of students in selected vocational colleges in China. In such descriptive studies, researchers typically collect data by using questionnaires. The collected and measured data is used to analyze the relationship between the two variables. The method is used to test the degree of correlation that exists between two variables, rather than deliberately manipulating them. The conclusion of relevant analysis aims to provide suggestions and guidance for vocational students' career development, help them better plan their career, set career goals, and learn how to improve professional identity and vocational skills.

Participants of the Study - The selection of Quanzhou Huaguang Vocational College and Quanzhou Qinggong Vocational College as the study's settings provides a comparative framework for understanding career orientation among vocational students. With approximately 1000 students in each college, the study encompassed a sizable sample size, ensuring adequate representation of the student population. The study focused on the 300 respondents which where selected using random sampling procedures to further enhance the study's credibility by minimizing selection bias and ensuring that each participant has an equal chance of being included in the sample. Including participants from freshman to junior levels, as well as graduates with work experience, the study encompassed a broad spectrum of career stages. This approach allows for the exploration of career orientation across different phases of education and career development, providing insights into how attitudes and priorities

may evolve over time. The inclusion of both current students and graduates who have worked for many years offers a comprehensive perspective on career orientation. Moreover, by selecting participants from vocational colleges, the study focuses on a specific demographic group known for its practical orientation towards career preparation. This targeted approach allows for a deeper understanding of career orientation within the context of vocational education, addressing the unique challenges and opportunities faced by vocational students in their career decision-making processes.

Data Gathering Instruments - The instrument used in this study included a carefully tailored three-part questionnaire, reflects a systematic approach to investigating career orientation and professional identity among vocational college students. The questionnaire was meticulously crafted to capture relevant information about the respondents' profiles, career orientation, and professional identity. The questionnaire is divided into three distinct parts and demonstrates a structured approach to gathering data on different facets of the participants' experiences and perspectives. The first part of the questionnaire focused on collecting demographic information, such as the respondents' majors, sex, and age. The second part delved into the career orientation of vocational college students. This section likely included questions related to factors such as autonomy, security, lifestyle preferences, and technical function, as discussed earlier. The questionnaire was from Kostermans (2019). The third part of the questionnaire explored the professional identity of the students. This likely included inquiries into their sense of belonging, commitment, and alignment with their chosen profession, drawing from established frameworks such as the Professional Identity Status Questionnaire (PISQ-5d). The rigorous pilot testing procedures conducted prior to the main study demonstrate a commitment to ensuring the reliability and effectiveness of the measuring instruments. Pilot testing involves administering the questionnaire to a small sample of participants to identify any ambiguities, inconsistencies, or issues with clarity or comprehensiveness. This process helps refine the questionnaire before it is administered to the full sample. Conducting pilot testing, researchers can enhance the validity and reliability of the data collected, thereby strengthening the overall quality of the study's findings. The reliability coefficient, often measured using Cronbach's alpha, assesses the internal consistency of a questionnaire or scale. A coefficient closer to 1 indicates higher reliability, suggesting that the items within the questionnaire consistently measure the same underlying construct. In this study, the reliability coefficients for each part of the questionnaire were notably high, with values of 0.974, 0.971, and 0.970, respectively. These coefficients exceed the commonly accepted threshold of 0.7, indicating strong internal consistency. The high reliability coefficients provide confidence in the validity of the questionnaire and support the accuracy and consistency of the data collected for analysis.

Data Gathering Procedure - This study followed different steps to complete the data gathering process. First, the content validity and reliability of the questionnaire were determined. Then, the researcher asked the two vocational colleges for permission to do the questionnaire. After explaining the purpose of the questionnaire in detail, the researcher asked permission to do the questionnaire, made online questionnaires with the help of the questionnaire star on Wechat platform, distributed questionnaires to students and graduates in the selected colleges, and collected and sorted out the data in time.

Data Analysis - Frequency and percentage distribution were used to present the demographic profile of the respondents in terms of sex, age, and major. Weighted mean and rank were used to assess the career orientation of the students in terms of autonomy independence, security stability, lifestyle, and technical function; as well as to describe the professional identify of the respondents in terms of affirmation, in-depth exploration, practice, identification with commitment, and reconsideration with commitment. Mann-Whitney U test for two groups and Kruskal Wallis test for more than two groups were used as part of the non-parametric tests to determine the significant differences on the respondent's assessment to career orientation and professional identify when grouped according to profile. Likewise, Spearman rho was used to test the significant relationship between career orientation and professional identify. All analysis were performed using SPSS version 26.

Ethical Consideration - The students who participated in this study from Chinese vocational colleges had the right to know the purpose of the experiment; they were informed that answering the questionnaire was purely

voluntary, and they were assured of the confidentiality of the data they were willing to share. The questionnaire was filled out anonymously, ensuring that no information about the respondents or the completion of the questionnaire would be disclosed. The results of the research would only be used for master's thesis research and could not be used for other purposes. Importantly, the study sought approval of the Ethics Committee of Lyceum of the Philippines University.

3. Result and discussion

Table 1

Summary Table Career Orientation of Vocational College Students

Key Result Areas	Weighted Mean	Verbal Interpretation	Rank
Autonomy Independence	3.09	Agree	2
Security Stability	3.22	Agree	1
Lifestyle	3.07	Agree	3
Technical Function	2.95	Agree	4
Composite Mean	2.97	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

With a mean score of 3.22, security stability emerges as the highest priority among vocational college students. This suggests that students highly value opportunities for long-term stability, job security, and financial security in their career paths. They prioritize roles and environments that offer a sense of stability and predictability. Following closely with a mean score of 3.09, autonomy independence is the second-highest priority for vocational college students. This indicates that students aspire to have control over their work processes, schedules, and decision-making. They value the freedom to work in their own way and on their own terms. Lifestyle comes in third, with a mean score of 3.07, indicating that vocational college students place importance on achieving a balance between their personal and professional lives. They seek careers that allow them to integrate personal, family, and work needs, prioritizing work-life balance, and personal fulfillment.

Technical function ranks lowest among the four dimensions of career orientation, with a mean score of 2.95. This suggests that while vocational college students recognize the importance of technical skills and expertise, they may not prioritize technical function as highly as security stability, autonomy independence, and lifestyle considerations in their career decisions. The right work attitude can make the work more fulfilling and effective, and the work attitude determines the work results. In simple terms, workplace security comes from three core factors: job certainty, control over the job, and the degree to which the job is irreplaceable. All three elements are indispensable, and if you lose any of them, you will feel a crisis in the workplace. Therefore, the teachers in vocational colleges should strengthen the career orientation of students, train students to have a clear understanding of employment positions, and master the knowledge and skills required for employment positions. Only in this way can students have a sense of security in the workplace. Many students blindly yearn for economically developed cities and regions and blindly pursue freedom in their jobs and high-paying careers (Almusharraf, 2020).

Key Result Areas	Weighted Mean	Verbal Interpretation	Rank
Affirmation	3.23	Agree	2
In-depth Exploration	3.27	Agree	1
Practice	3.21	Agree	3
Identification with Commitment	3.15	Agree	5
Reconsideration with Commitment	3.18	Agree	4
Composite Mean	3.21	Agree	

Table 2

Summary Table on Professional Identity of Vocational College Students

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

Table 2 provides a summary of the professional identities of the participants, with a composite average score of 3.21. This average indicates a generally positive perception of professional identity among the respondents. The indicators with the highest scores are "In-depth exploration" and "Affirmation," both with a weighted score of 3.27. This suggests that respondents highly value the opportunity for exploration within their chosen

profession and affirm their commitment to it. These high scores indicate a strong sense of curiosity, engagement, and confidence in their professional identity. Following closely is the indicator "Practice" with a mean score of 3.21. This suggests that respondents perceive practical experience and application within their profession as important aspects of their professional identity. It reflects a recognition of the importance of hands-on learning and skill development in preparing for future careers.

Hoorens, et al. (2021) found that self-affirmation reduced gender bias in student evaluations of professors. Participants who lacked confidence in their gender displayed bias against female lecturers, but self-affirmation eliminated this bias, suggesting that gender bias may be caused by overvaluing male academics rather than demeaning female ones. Moreover, Kumar, et al. (2022) explored the mediated connections between the motivation to be unprejudiced and instructional practices via explicit bias. They also found concerning evidence of unconscious bias among White preservice teachers, highlighting the need for culturally aware teaching practices. On the other hand, the indicators "Reconsideration with commitment" and "Identification with commitment" received lower mean scores of 3.18 and 3.15, respectively. While these scores still indicate agreement among respondents, they suggest a slightly lower level of emphasis on reconsidering or identifying with their professional commitments compared to the other dimensions measured. The findings suggest that work experience correlates with how college students assign meaning to their professional identity, thus forming three distinct networks for these groups. This shows that they agree with all five sub-domains, with commitment as the consideration at the highest level. This shows that during the learning process of these students, they repeatedly thought about whether they were confident in their major. In China, if an employee is not satisfied with his or her job or position, he or she can change jobs, commonly known as job-hopping or job changing. Before changing one's job, one must make all kinds of preparations. If they prepare well, they will succeed. However, if they are not fully prepared, it is not only a waste of time, but also can delay career development. Binning, et al. (2021) discovered that while self-reported psychological threat did not decrease with affirmation, it did break the association with performance. Affirmation interfered with the negative cognitive and motivational effects of threat, leading to improved academic outcomes. Borman, et al., (2021) investigated the impact of self-affirming interventions on the achievement gap between racial and ethnic minority students and their peers. They found that such interventions significantly reduced the achievement gap and increased on-time graduation rates among treated minority students.

Table 3

Relationship Between career Orientation and Professional Identity

Autonomy Independence	Rho-value	P-value	Interpretation
Affirmation	.501**	0.0000	Highly Significant
In-depth Exploration	.391**	0.0000	Highly Significant
Practice	.414**	0.0000	Highly Significant
Identification with Commitment	.446**	0.0000	Highly Significant
Reconsideration with Commitment	.366**	0.0000	Highly Significant
Security Stability			
Affirmation	.048	0.408	Not Significant
In-depth Exploration	.048	0.403	Not Significant
Practice	.044	0.449	Not Significant
Identification with Commitment	.022	0.706	Not Significant
Reconsideration with Commitment	.068	2.42	Not Significant
Lifestyle			-
Affirmation	.501**	0.0000	Highly Significant
In-depth Exploration	.418**	0.0000	Highly Significant
Practice	.476**	0.0000	Highly Significant
Identification with Commitment	.436**	0.0000	Highly Significant
Reconsideration with Commitment	.409**	0.0000	Highly Significant
Technical Funtion			
Affirmation	.541**	0.0000	Highly Significant
In-depth Exploration	.441**	0.0000	Highly Significant
Practice	.508**	0.0000	Highly Significant
Identification with Commitment	.486**	0.0000	Highly Significant
Reconsideration with Commitment	.408**	0.0000	Highly Significant
Legend: Significant at p-value < 0.01			

Table 3 presents the association between career Orientation and Professional Identity. The computed r-values indicate a moderate direct correlation and the resulted p-values were less than the alpha level. This means that there was significant relationship exists except on security stability. Result implies that the better is the career orientation, the better is the professional identity. This indicates that as career orientation improves, there is a tendency for professional identity to also improve, and vice versa. Furthermore, the resulting p-values being less than the alpha level indicate that the observed relationships are statistically significant, except in the case of security stability.

The significant relationship between career orientation and professional identity underscores the interconnectedness of these constructs in shaping individuals' perceptions of their careers and professional roles. When individuals have a clearer sense of their career goals, preferences, and aspirations (career orientation), they are more likely to develop a stronger sense of identity and commitment to their chosen professions (professional identity). This alignment between career orientation and professional identity is essential for individuals' career satisfaction, engagement, and overall well-being (Chen, et al. 2020). However, the lack of a significant relationship between security stability and professional identity suggests that other factors may influence individuals' perceptions of job security and stability independently of their career orientation. This highlights the complexity of professional identity formation and the need for further exploration into the specific factors that contribute to individuals' sense of security and stability in their careers. The findings further suggest that when given enough orientation as to affirmation, in-depth exploration, practice, identification as well as reconsideration with commitment in the program they are enrolled in, then they are satisfied with their professional identity. At work, they believe they can do what they like to do seriously, will gain a certain sense of accomplishment, and at the same time, will have a better sense of identity with their career.

Professional identity refers to an individual's perception of the goals, social values, and other factors of the occupation. (Li, et al. 2021). Only by recognizing the work from the heart can an employee devote to the work practice and exert greater energy. Hence, professional identity can affect employee loyalty, motivation, sense of achievement and professionalism. Professional identity is the psychological basis for people to work hard and achieve organizational goals. With the development of occupation and the deepening of occupational research, the concept of occupational identity is also developing towards a continuous state of socialization, diversification and humanization, and is no longer limited to a psychological perspective. The results of the study have a certain relationship with Algadheeb, et. al.,(2015), indicating that there is no difference in the career awareness of students from different majors in terms of security and stability.

Table 4

Troposeu curee. De					
Key Result Area	Plan and Strategies	Success Indicator	Person/s or Organization		
and Objectives			Responsible		
Career Orientation	Career Orientation				
1.1. Technical	- Develop a mentorship program: Pair	- Increased employee	- Human Resources Department:		
Function	experienced employees with newcomers to	retention rates of 25%	Oversee the development and		
Objective: To	provide guidance and support during	during and after	implementation of mentorship		
mitigate concerns	rotational assignments.	rotational assignments.	programs, job rotation schedules,		
about leaving an	- Implement job rotation schedules: Design	- Positive feedback from	and training initiatives.		
organization due	rotational schedules that balance skill	employees regarding the	- Department Managers:		
to rotational	development with continuity in specific	effectiveness of	Coordinate with HR to facilitate		
assignments that	roles to alleviate concerns about expertise	mentorship programs	smooth transitions during		
might restrict	limitation.	and training	rotational assignments and provide		
expertise	- Offer continuous training and	opportunities.	feedback on employee		
development.	development: Provide ongoing training	- Enhanced performance	performance and development.		
	opportunities to ensure employees acquire	metrics indicating skill			
	new skills and knowledge during rotational	development and			
	assignments.	knowledge acquisition.			
2. Professional Identity					
2.1. Identification	- Organize workshops to help employees	- Employee engagement	- Talent Development		
with Commitment	identify their strengths, values interests, and	and satisfaction levels	Department: Organize		
Objective: To	values, aligning them with career	increased by 20%.	self-assessment workshops,		

Proposed Career Development Plan for Vocational Students in China

self-understanding and instill a sense of professional security within the chosen field Facilitate networking events and create forums where employees can share experiences and insights, fostering a sense of community and professional identity. - Offer personalized career counseling sessions and coaching to help employees navigate career paths and address any uncertainties or insecurities.	 Retention rates among employees with a strong sense of professional identity increased by 25%. At least 30% of employees who undergo career counseling and coaching experience positive career advancement outcomes. 	networking events, and career counseling sessions. - Employee Resource Groups: Facilitate peer support initiatives and provide platforms for employees to engage in networking and knowledge-sharing activities. - Managers and Supervisors: Encourage and support employees' participation in professional development activities and provide feedback on their progress and growth.

4. Conclusions and recommendations

The prevalence of lifestyle and security/stability as top career orientation factors among vocational students suggests a potential mismatch between students' career aspirations and the demands of the evolving job market. Educational institutions may need to reevaluate their curriculum and career counseling services to better align with students' career goals and industry trends. The varying levels of agreement with different aspects of professional identity affirmation highlight the importance of fostering a strong sense of commitment and confidence among vocational students. Strategies aimed at enhancing professional identity, such as mentorship programs and experiential learning opportunities, could be prioritized to support students in their career journeys. The significant correlation between career orientation and professional identity emphasizes the interconnectedness of these constructs. This underscores the importance of holistic career development interventions that address both aspects comprehensively. The researcher's proposal for a career development plan tailored to vocational college students in China serves as a practical guide for educational institutions and policymakers. Implementing such a plan could enhance students' career readiness and competitiveness in the job market, ultimately contributing to their overall success and satisfaction.

Based on the findings, the following were recommended: College Administrator may enhance collaboration with industry partners to provide internship opportunities and practical experiences aligned with students' career interests. They may also allocate resources for the establishment of mentorship programs and professional development initiatives to support students' career readiness. College Counselor may offer personalized career counseling sessions to help students identify their strengths, interests, and values and align them with career goals. They may also provide guidance on developing essential skills such as resume writing, interview preparation, and networking to enhance students' competitiveness in the job market. College Students may actively engage in career exploration activities, such as internships, part-time jobs, and volunteer opportunities, to gain practical experience and clarify career goals. They may also take advantage of campus resources, such as career centers and counseling services, to access support and guidance in career planning and development. Future researchers may conduct similar study investigating on innovative approaches and interventions to enhance career readiness and success among vocational college students in diverse contexts. The proposed development plan may be reviewed and utilized to enhance the career readiness and competitiveness of vocational college students. Also, the administration may regularly assess and evaluate the implementation of the development plan to identify areas for improvement and make necessary adjustments to meet students' evolving needs and aspirations.

5. References

Algadheeb, Nourah A., Princess Nourah Bint Abdulrahman, (2015), Professional/Career Orientation,

Awareness, And Their Relationship To Locus Of Control. Journal of College Teaching & Learning-First Quarter 2015 Volume12, Number1.

Almusharraf, N. (2020). Teachers' perspectives on promoting learner autonomy for vocabulary development: A

case study. Cogent Education, 7(1), 1823154.

- Binning, K. R., Cook, J. E., Greenaway, V. P., Garcia, J., Apfel, N., Sherman, D. K., & Cohen, G. L. (2021). Securing self-integrity over time: Self-affirmation disrupts a negative cycle between psychological threat and academic performance. *Journal of Social Issues*, 77(3), 801-823.
- Borman, G. D., Choi, Y., & Hall, G. J. (2021). The impacts of a brief middle- school self-affirmation intervention help propel African American and Latino students through high school. *Journal of Educational Psychology*, 113(3), 605.
- Chen, X., Zhong, J., Luo, M., & Lu, M. (2020). Academic self-efficacy, social support, and professional identity among preservice special education teachers in China. *Frontiers in psychology*, 11, 374.
- Hoorens, V., Dekkers, G., & Deschrijver, E. (2021). Gender bias in student evaluations of teaching: Students' self-affirmation reduces the bias by lowering evaluations of male professors. *Sex Roles*, *84*(1), 34-48.
- Kumar, R., Gray, D. L., & Toren, N. K. (2022). Pre-service teachers' desire to control bias: Implications for the endorsement of culturally affirming classroom practices. *Learning and Instruction*, 78, 101512.
- Li, N., Fan, W., Wiesner, M., Arbona, C., & Hein, S. (2021). Adapting the Utrecht-Management of Identity Commitments Scale to assess engineering identity formation. *Journal of Engineering Education*, 110(4), 885-901.