



EDUCATIONAL PRIORITIES AND CAREER PREPARATION AMONG ICT STUDENTS AT DIFFERENT STAGES OF HIGHER EDUCATION, AND INSTITUTIONAL SUPPORT

Dr. Srinivasan Nagaraj¹

¹Chaitanya Bharathi Institute Of Technology, Proddatur, AP-516360, Email: sri.mtech04@gmail.com

Article History:

Article Type: **Research**

Received Date: 27/04/2026

Revised Date: 10/07/2026

Accepted Date: 09/08/2026

Published Date: 29/08/2026

Keywords: IICT

education, career preparation, career readiness, educational priorities, higher education.

ABSTRACT

Career preparation in information and communication technology (ICT) education requires the integration of academic learning, practical competencies, institutional support, and progressive engagement with employment-oriented activities. This study examined educational priorities, career-preparation behaviours, institutional support, and perceived career readiness across stages of higher education. A quantitative cross-sectional analysis was conducted using a dataset of 600 ICT students equally distributed across early, middle, and final educational stages. Stage differences were assessed using analysis of variance, Welch's ANOVA, chi-square tests, effect sizes, and multivariable modelling. Educational priorities shifted from academic performance toward technical skills, practical projects, professional certification, and industry exposure as educational stage advanced. Career Preparation Index increased from 0.134 in early-stage students to 0.487 in final-stage students, while Career Readiness Score increased from 2.793 to 3.759. Final-stage students showed markedly greater engagement in internships, portfolio development, interview preparation, and active job searching. Multivariable analysis identified educational stage and institutional support as significant correlates of career preparation and readiness, while career-preparation engagement was strongly associated with readiness. These findings support progressively embedding career-development opportunities throughout ICT programmes. Empirical longitudinal and multi-institutional studies are required to validate these data patterns and assess their generalizability.

1. Introduction

Digital transformation has transformed higher education, impacting teaching methods, institutional processes, competences, and the higher educational institution's role in the labour market. Universities are increasingly required to educate their students for technology-rich working environments where knowledge and occupational skills are constantly changing (Akour & Alenezi, 2022; Hasynets et al., 2024). The shift involves the development of higher education systems from traditional knowledge sharing to learning systems that integrate transferable, practical and digital skills and competencies in the process of acquiring knowledge in a given discipline (Syich et al., 2021). Technological innovation is of special importance to information and communication technology (ICT) students as it constantly changes the nature of jobs, the skill needs for these jobs, and the skills that are available for the jobs. Technological change can alter the nature of work activities and the requirement for skills, and raise uncertainty over future work patterns (Autor, 2022). Thus, ICT graduates must be equipped with academic knowledge and skills to meet the changing demands of the workplace.

The priorities given in education can have an impact on the preparation for this transition. While academic success is still relevant, employability becomes more and more dependent on a wider range of technical, specific, hands-on, professional certification, social and interpersonal, and career-management skills. Educational and psychological resources have been linked to students' employability development; academic performance and self-efficacy have been linked to employability development, suggesting that there may be interaction between educational and psychological resources in preparing students for employment (Li et al., 2022). In the same way, structured learning experiences can boost employability by linking academic growth and learning with career preparation (Clemente et al., 2020). The relevant priorities for ICT students may thus be academic performance, acquisition of skills, project-based learning, examinations, soft skills, research, entrepreneurship and industry exposure. In addition to technical skills, there is a need for flexibility in professional and inter-personal skills for career management in digitally oriented professions (Macedo et al., 2023).

Career preparation activities are those in which students build their employability and demonstrate it, such as internships, certifications, career workshops, and networking with professionals, building a portfolio, hackathons, interview preparation, job searching, etc. Of course, career readiness is a sense of students' ability to manage transition to employment, in terms of their confidence in their abilities, knowledge about career opportunities, and readiness for recruitment. Contemporary careers are becoming more flexible and dynamic, hence the need for adaptation and career management to be performed continuously during the career. (Tomlinson et al., 2018). For this reason, universities are crucial to integrating career development into students' learning experience and not focusing on support just before graduation (Shanks, 2024).

These priorities and behaviours may differ according to students' stage of higher education. Early-stage ICT students might focus on academic transition and knowledge, while middle-stage students might increasingly work on projects and technical specialization, and focus on professional development. For students at the very end of their academic careers may be more focused on Internships, Networking, Portfolios, Interviews, and Employment opportunities. Institutional resources, such as career services, faculty guidance, industry exposure, and practical learning opportunities, can also play a supporting role and enhance students' readiness for occupational transitions (Fletcher et al., 2025).

While there has been increasing focus on research on digital education, employability, and career readiness, each of these is studied individually. The effect of the interaction between some educational priorities, career preparation behaviours, institutional support and perceived career readiness on each educational stage has received scant attention among ICT students. Closing this gap can help new career development strategies be more responsive to the stages. In this regard, this study explores educational priorities, career preparation, and career readiness in the context of ICT students in early, middle, and final year of higher education institutions, as well as potential academic and institutional factors that contribute to career readiness.

Research Objectives

1. To examine and compare the educational priorities and career-preparation behaviours of ICT students across early, middle, and final stages of higher education.
2. To assess differences in perceived institutional support and career readiness among ICT students at different stages of higher education.
3. To determine the academic, educational, and institutional factors associated with career-preparation engagement and perceived career readiness among ICT students.

2. Methodology

2.1 Research Design and Dataset

This study was designed using quantitative cross sectional analytical design to study educational priorities and preparation for career among ICT students. A data set of 600 student records was used in the study covering the initial, middle, and final phases of higher education. This dataset included a wide range of demographic, academic, educational and career-development characteristics. This was done to simulate all observations and not actual humans.

2.2 Study Variables and Measurement

Study variables were categorized into four groups: educational priorities, institutional supports, career-preparation behaviours and career readiness. The areas of educational priorities included Academic achievement, technical skills, practical learning, certification, soft skills, Research, Entrepreneurship, and Industry exposure. Career preparation activities encompassed workshops, networking, internships, job search, portfolios, and hackathons, as well as interview preparation. Five-point Likert scales or binary participation indicators were used for measures of relevant constructs.

2.3 Composite Measures and Reliability Assessment

Four composite indices were created to summarize the focus areas of the study: Educational Priority, Institutional Support, Career Preparation, and Career Readiness. A higher score meant a higher degree of prioritization, support, preparation or perceived readiness. Cronbach's alpha was used to determine internal consistency of multi-item measures. If data for scale items were related, exploratory factor analysis was used to examine the underlying structure and coherence of these items.

2.4 Statistical Analysis

Frequencies, percentages, means, standard deviations, medians and interquartile ranges were used as appropriate for descriptive statistics. One way ANOVA, Welch's ANOVA and Kruskal-Wallis testing was used to analyze differences between early, middle and final stage students depending on the statistical assumptions. Categorical career-preparation differences were examined by a chi-square test while relationships among study constructs were examined by a Pearson or Spearman correlation. Appropriate post-hoc comparisons and effect sizes were used to interpret significant group differences.

2.5 Multivariable Analysis and Reproducibility

Multivariable regression analysis was used to determine whether academic, educational, and institutional factors were associated with career preparation engagement and perceived career readiness. The effect estimates were presented as 95% CI, p-values and appropriate model fit statistics and the significance level was $p < 0.05$. Before the interpretation of the model assumptions and multicollinearity were assessed. The data set used were data sets, no personally identifiable data was used, and the analytical methods and variable definitions were described reproducibly.

3. Results

3.1 Demographic and Academic Characteristics

The study consisted of 600 ICT students: 200 students in the early stages, 200 students in the middle stages and 200 students in the final stages of ICT education. Demographic and academic characteristics of the participants are presented in Table 1. Mean age increased from 19.86 ± 1.16 years in the early stage to 22.36 ± 1.32 years in the final stage ($p < 0.001$). Final-stage students also had the highest mean CGPA (7.39 ± 0.74 ; $p < 0.001$). There was no significant difference in the distribution of gender in the ICT programme across the stages. The percentage of students working part-time during their studies, on the other hand, rose from 12.5% of early-stage students to 27.5% of final-stage students ($p < 0.001$). The final-stage students were more likely to have a job than the early-

stage students, who were more likely to plan to undertake postgraduate studies or were uncertain about their future.

Table 1. Demographic and Academic Characteristics of ICT Students by Educational Stage

Characteristic	Overall	Early	Middle	Final	p-value
Age, years	21.14 ± 1.63	19.86 ± 1.16	21.20 ± 1.33	22.36 ± 1.32	<0.001
CGPA (10-point scale)	7.24 ± 0.72	7.13 ± 0.71	7.19 ± 0.69	7.39 ± 0.74	<0.001
Male	339 (56.5%)	106 (53.0%)	111 (55.5%)	122 (61.0%)	0.302
Female	243 (40.5%)	85 (42.5%)	82 (41.0%)	76 (38.0%)	0.302
First-generation student	185 (30.8%)	66 (33.0%)	62 (31.0%)	57 (28.5%)	0.621
Part-time employment	114 (19.0%)	25 (12.5%)	34 (17.0%)	55 (27.5%)	<0.001
Employment intention	316 (52.7%)	83 (41.5%)	97 (48.5%)	136 (68.0%)	<0.001
Postgraduate-study intention	136 (22.7%)	59 (29.5%)	49 (24.5%)	28 (14.0%)	<0.001

3.2 Educational Priorities Across Higher-Education Stages

There were systematic shifts in educational priorities by stage of education as shown in Table 2. Academic-performance priority decreased from 3.94 ± 0.56 in early-stage students to 3.63 ± 0.57 in final-stage students ($p < 0.001$, $\eta^2 = 0.049$). Technical skills, practical projects, professional certification, soft skills and industry exposure, on the other hand, gained increasing significance. The highest stage related difference was for industry exposure ($\eta^2 = 0.223$); the second highest difference was for professional certification ($\eta^2 = 0.207$), and the third highest was for practical projects ($\eta^2 = 0.165$). There also were significant, but small, differences between the research orientation and the entrepreneurship. The progression of shift from academic to applied and employment-based priorities is also seen across the continuum of education in Figure 1.

Table 2. Educational Priorities of ICT Students Across Educational Stages

Educational Priority	Early, Mean ± SD	Middle, Mean ± SD	Final, Mean ± SD	p-value	η^2
Academic performance	3.94 ± 0.56	3.82 ± 0.58	3.63 ± 0.57	<0.001	0.049
Technical skills	3.54 ± 0.54	3.79 ± 0.61	4.05 ± 0.60	<0.001	0.114
Practical projects	3.31 ± 0.62	3.67 ± 0.63	3.98 ± 0.61	<0.001	0.165
Professional certification	3.12 ± 0.52	3.46 ± 0.55	3.78 ± 0.52	<0.001	0.207
Soft skills	3.23 ± 0.59	3.37 ± 0.60	3.60 ± 0.63	<0.001	0.058
Research	2.73 ±	2.88 ±	2.90 ±	0.028	0.012

orientation	0.70	0.72	0.63		
Entrepreneurship	2.85 ± 0.73	2.94 ± 0.77	3.08 ± 0.76	0.007	0.016
Industry exposure	3.25 ± 0.52	3.55 ± 0.53	3.89 ± 0.40	<0.001	0.223

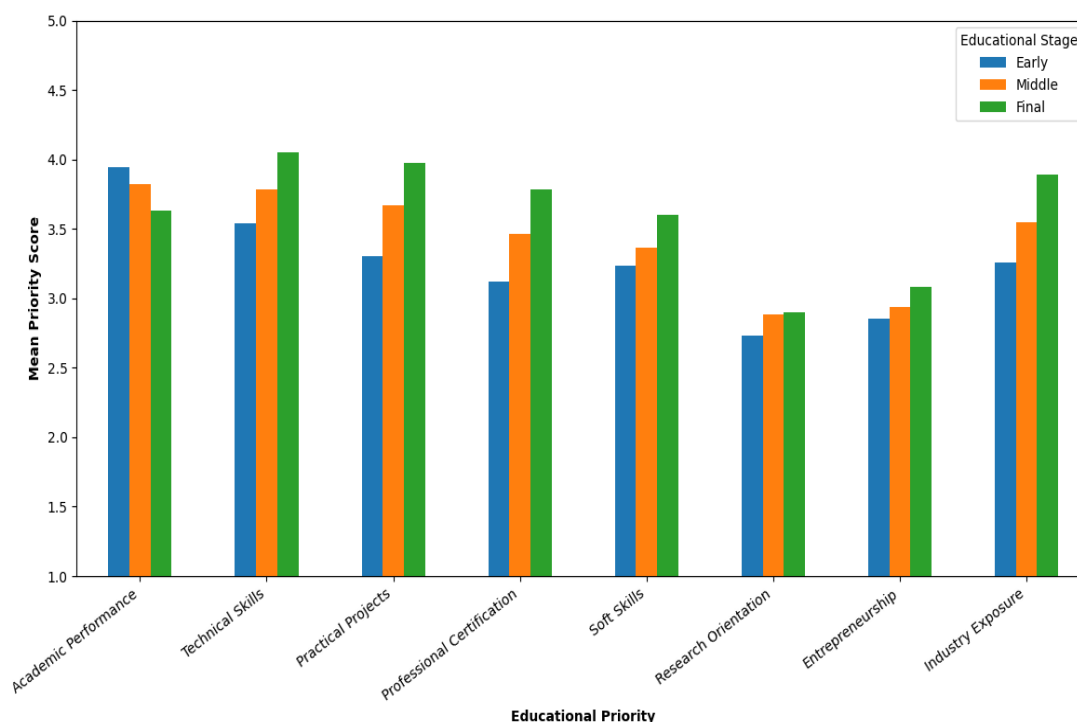


Figure 1. Stage-Wise Variation in Educational Priorities Among ICT Students

3.3 Career-Preparation Behaviours Across Educational Stages

The stage-related differences in career-preparation activities were quite large (Table 3). Students participated in internship more than early-stage students, $p < 0.001$, Cramér's $V = 0.315$, and there was a statistically significant difference between the two groups. The participants increased their portfolio development from 23.5% to 69.5% and interview preparation from 8.5% to 49.5%. Active job searching was the strongest association ($\chi^2 = 178.07$, $p < 0.001$, $V = 0.545$) in the early stage, middle stage, and final stage of the career. The graphic summary (Figure 2) shows how the engagement of students in career preparation increased over time as they neared completion of higher education.

Table 3. Career-Preparation Behaviours According to Educational Stage

Career-Preparation Activity	Early, n (%)	Middle, n (%)	Final, n (%)	p-value	Cramér's V
Internship	19 (9.5%)	71 (35.5%)	86 (43.0%)	<0.001	0.315
Professional certification	40 (20.0%)	58 (29.0%)	89 (44.5%)	<0.001	0.218
Portfolio development	47 (23.5%)	89 (44.5%)	139 (69.5%)	<0.001	0.377
Professional networking	28 (14.0%)	73 (36.5%)	95 (47.5%)	<0.001	0.297
Career-service	26 (13.0%)	44 (22.0%)	66 (33.0%)	<0.001	0.195

use					
Hackathon participation	30 (15.0%)	69 (34.5%)	71 (35.5%)	<0.001	0.209
Interview preparation	17 (8.5%)	62 (31.0%)	99 (49.5%)	<0.001	0.367
Active job search	8 (4.0%)	62 (31.0%)	134 (67.0%)	<0.001	0.545

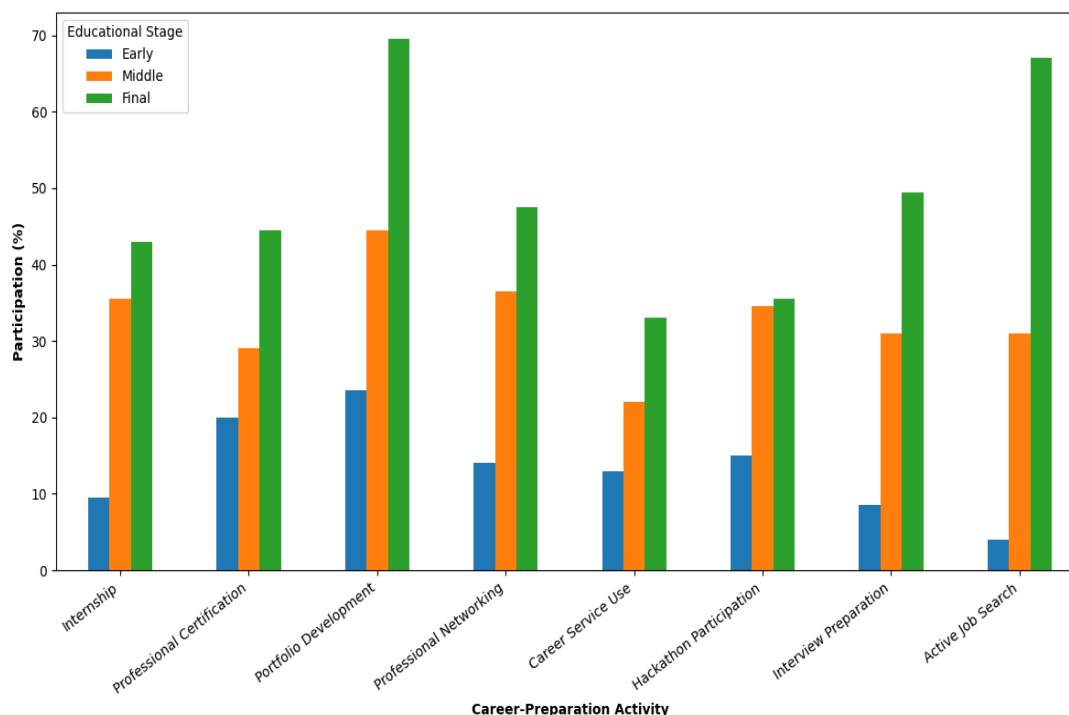


Figure 2. Career-Preparation Activity Participation Across Educational Stages

3.4 Institutional Support and Career Readiness

Table 4 presents the summary of institutional support, career-preparation engagement and perceived career readiness for the three educational stages. The Institutional Support Score was found to have very small differences between the early-stage students (3.085 ± 0.530) and the final-stage students (3.203 ± 0.531) with a very small effect ($p = 0.041$, $\eta^2 = 0.011$). In contrast, the Career Preparation Index increased from 0.134 ± 0.132 to 0.487 ± 0.187 ($p < 0.001$, $\eta^2 = 0.446$). Career Readiness Score similarly increased from 2.793 ± 0.421 among early-stage students to 3.759 ± 0.411 among final-stage students ($p < 0.001$, $\eta^2 = 0.465$). Career preparation and perceived readiness were therefore significantly steeper than institutional support for the educational stage gradient as shown in Figure 3.

Table 4. Institutional Support, Career Preparation, and Career Readiness by Educational Stage

Outcome	Early, Mean $\pm$ SD	Middle, Mean $\pm$ SD	Final, Mean $\pm$ SD	p-value	η^2
Institutional Support Score	3.085 ± 0.530	3.196 ± 0.505	3.203 ± 0.531	0.041	0.011
Career Preparation Index	0.134 ± 0.132	0.330 ± 0.160	0.487 ± 0.187	<0.001	0.446

Career Readiness Score	2.793 ± 0.421	3.294 ± 0.441	3.759 ± 0.411	<0.001	0.465
------------------------	---------------	---------------	---------------	--------	-------

Abbreviations: SD, standard deviation; η^2 , eta squared. Institutional Support and Career Readiness were scale-based composite measures; Career Preparation Index represented the proportion of eight career-preparation activities undertaken.

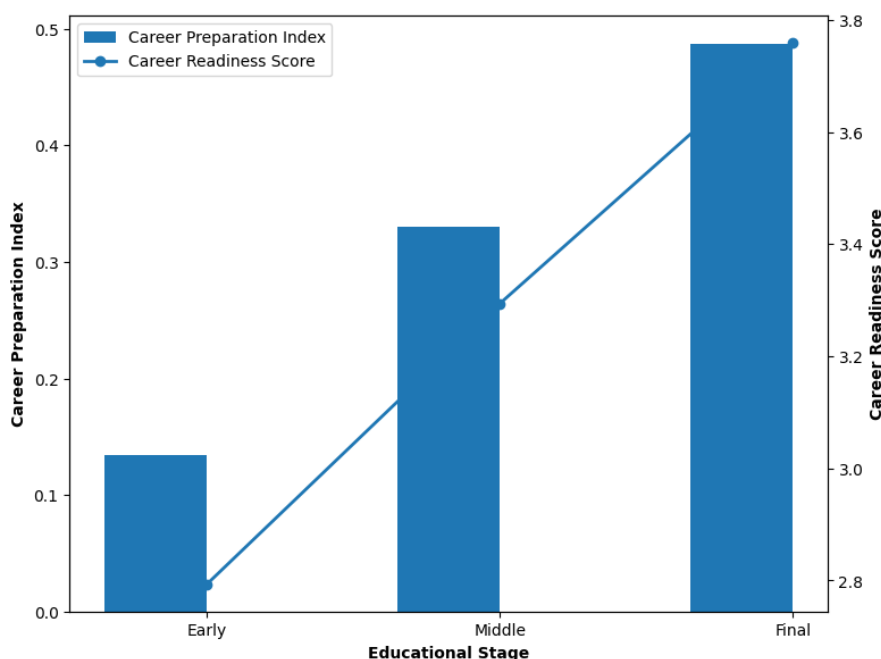


Figure 3. Career Preparation and Career Readiness Across Educational Stages

3.5 Factors Associated with Career Preparation and Career Readiness

Several independent factors were found in the multivariable modelling analysis in relation to career preparation and readiness (Table 5). Career Preparation Index had the highest continuous coefficient ($\beta = 0.857$, $p < 0.001$), and the others were also found to be positively correlated with readiness, namely, CGPA ($\beta = 0.787$, $p < 0.001$), institutional support ($\beta = 0.549$, $p = 0.001$), practical-project priority ($\beta = 0.186$, $p = 0.037$), and industry-exposure priority ($\beta = 0.164$, $p = 0.048$). The adjusted coefficients and 95% confidence intervals for the career-readiness model are shown in Figure 4.

Table 5. Significant Multivariable Predictors of Career Preparation and Career Readiness

Outcome	Predictor	Adjusted Effect (95% CI)	p-value
Career preparation	Middle vs Early stage	OR 2.79 (2.28–3.42)	<0.001
Career preparation	Final vs Early stage	OR 4.92 (3.81–6.35)	<0.001
Career preparation	Institutional support	OR 1.41 (1.24–1.60)	<0.001
Career preparation	Technical-skill priority	OR 1.19 (1.06–1.33)	0.004

Career readiness	Middle vs Early stage	β 0.266 (0.176–0.355)	<0.001
Career readiness	Final vs Early stage	β 0.528 (0.402–0.655)	<0.001
Career readiness	CGPA	β 0.121 (0.078–0.164)	<0.001
Career readiness	Institutional support	β 0.182 (0.128–0.236)	<0.001
Career readiness	Practical-project priority	β 0.068 (0.017–0.119)	0.009
Career readiness	Industry-exposure priority	β 0.073 (0.009–0.137)	0.026
Career readiness	Career Preparation Index	β 0.857 (0.687–1.027)	<0.001

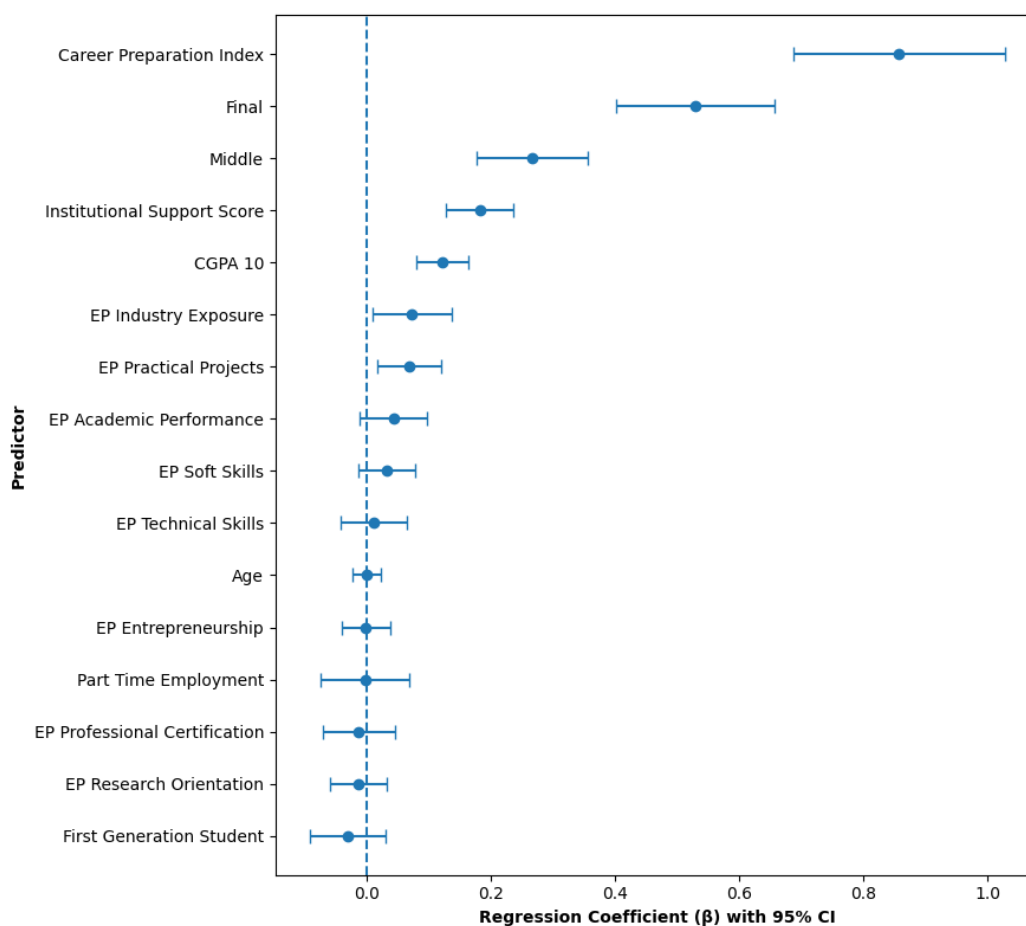


Figure 4. Adjusted Multivariable Associations with Career Readiness

4. Discussion

The results reveal a significant variation in educational priorities, career preparations behaviours, and perceived career readiness across the levels of higher education among students in the ICT field. Earlier students focused on performance and final stage students focused more on technical skills, hands-on project, industry exposure, industry certification and soft skills. The stage-related differences in industry exposure was the largest of educational priorities, followed by professional

certification ($\eta^2 = 0.223$ and 0.207 , respectively) and practical projects ($\eta^2 = 0.165$). This sequence highlights the growing importance of the use of the competencies as students prepare to enter the world of work. In today's technological world, in which the knowledge of a discipline is increasingly complemented by digital, technical and transferable skills (Gleason, 2018), higher education is faced with new challenges. Digital literacy has become a key skill in current occupational and educational contexts, where technology plays a pivotal role in both settings (Mokhtari, 2023). Digital competencies are also necessary in educational and/or occupational contexts where knowledge is primarily conveyed via digital channels (Liesa-Orús et al., 2020).

There were significant differences between the different stages for career-preparation behaviours. The number of students at higher levels of education who participated in internships, were professionally certified, were developing their portfolios, networking, using career services, preparing for interviews, and actively seeking employment was significantly higher. The presence of active job searching had the strongest relationship with educational stage, ranging from 4.0% among students in early educational stages, to 67.0% among students at the final educational stage (Cramér's $V = 0.545$). The Career Preparation Index also rose from 0.134 to 0.487. These patterns align with the understanding of career preparedness as a multidimensional nature that includes career planning, exploration, skill building, and adaptive behaviours, and not as one activity performed just before graduation (Marciniak et al., 2022).

Career readiness also significantly improved across education stages (mean scores going from 2.793 for students in the early stages to 3.759 for those in the final stages; $\eta^2 = 0.465$). Importantly, in multivariable analysis, educational stage continued to be significantly associated with readiness. Greater engagement on the Career Prep Index was strongly correlated with career readiness ($\beta = 0.857$, $p < 0.001$). Institutional support was the only factor to predict both career preparation and career readiness, highlighting the importance of career guidance, career internship support, industry networking and mentoring. Structured student support can help students develop their readiness for college and career by providing resources and support to help students through academic-to-career transitions (Fletcher et al., 2025).

The regression findings also revealed that CGPA and practical-project priority and industry-exposure priority were positively associated with career readiness, whereas technical-skill priority was positively associated with career-preparation engagement. The findings support the need to connect academic performance and vocational and work-related learning. This need is gaining in importance due to the impact of the use of Artificial Intelligence and related technologies in Higher Education and the professional field (Ocaña-Fernández et al., 2019). This new age of Generative AI also presents other opportunities and challenges in academic and professional learning, such as new research practices, digital skills, and responsible use of technology (Al-Zahrani, 2024; Williams, 2024).

The results in this study align with a developmental strategy for career development in ICT education, starting with career exploration and basic skills, then moving on to internships, industry exposure, networking, and employment preparation. The observed estimates, however, should not be considered as population-level evidence. Further research is needed to confirm these patterns with a multi-institutional, longitudinal sample of actual students in ICT and to explore how institutional support and the development of new technology impacts the transition from higher education to work.

5. Conclusion

The study offers a structured evaluation of the differences in the three dimensions of educational priorities, career preparation behaviours, institutional support and perceived career readiness at various phases of the process of ICT higher education. The results suggest that there is a gradual shift from academic focus in early years to technical skills, hands-on projects, professional certification, and industry experience in later years. The stage-related differences were most notable for career-preparation engagement and perceived career readiness, where students in the final stage of the program had significantly higher levels of internships, portfolio development, professional networking, preparation for interviews, and active job seeking. Multivariable analysis also revealed that educational stage and institutional support were important correlates of career preparation and readiness, and technical-skill priority was correlated with career-preparation engagement. The

positive associations with perceived career readiness were higher CGPA, practical-project priority, industry exposure, and career-preparation engagement. Together these results highlight the importance of integrating career development activities incrementally into the different stages of ICT degree programs instead of focusing on employability activities at the end of the program. Academic learning should be paired with work experience, industry engagement, career information, and planned learning experiences through the different stages of academic training. The observed relationships should be validated using empirical samples, obtained longitudinally and across multiple institutions, before generalisations are made. Further studies need to also explore the impact that new technologies and changing demands in the labour market have on students' career paths within the field of ICT.

References

1. Akour, M., & Alenezi, M. (2022). Higher education future in the era of digital transformation. *Education Sciences*, 12(11), 784.
2. Al-Zahrani, A. M. (2024). The impact of generative AI tools on researchers and research: Implications for academia in higher education. *Innovations in Education and Teaching International*, 61(5), 1029-1043.
3. Autor, D. (2022). The labor market impacts of technological change: From unbridled enthusiasm to qualified optimism to vast uncertainty (No. w30074). National Bureau of Economic Research.
4. Clemente, I. M., Giner, G. R., & Vélez, G. S. (2020). Towards sustainability in university education. Improving university graduates chances of employability by participation in a high achievement academic program. *Sustainability*, 12(2), 680.
5. Fletcher Jr, E. C., Carroll, T. K., Lee, B. H., & Burggraf, C. (2025). Student Supports for Achieving College and Career Readiness. *Journal of College Access*, 10(3), 4.
6. Gleason, N. W. (2018). Higher education in the era of the fourth industrial revolution (p. 229). Springer Nature.
7. Hasynets, Y., Vakerych, M., Solnyshkova, S., Pustovoichenko, D., & Kuruts, N. (2024). Transforming higher education in the digital age. *Futurity Education*, 4(2), 263-278.
8. Li, X., Pu, R., & Phakdeephrot, N. (2022). The influence of achievement motivation on college students' employability: A chain mediation analysis of self-efficacy and academic performance. *Frontiers in psychology*, 13, 972910.
9. Liesa-Orús, M., Latorre-Coscolluela, C., Vázquez-Toledo, S., & Sierra-Sánchez, V. (2020). The technological challenge facing higher education professors: Perceptions of ICT tools for developing 21st century skills. *Sustainability*, 12(13), 5339.
10. Macedo, R. R. D., Veloso, E. F. R., Pinsky, V., & Trevisan, L. (2023). Career management in digital age: a study of leadership's competencies and practices applied for IT professionals. *Revista de Administração da UFSM*, 16(1), e3.
11. Marciniak, J., Johnston, C. S., Steiner, R. S., & Hirschi, A. (2022). Career preparedness among adolescents: A review of key components and directions for future research. *Journal of Career Development*, 49(1), 18-40.
12. Mokhtari, F. (2023). Fostering digital literacy in higher education: Benefits, challenges and implications. *International Journal of Linguistics, Literature and Translation*, 6(10), 160-167.
13. Ocaña-Fernández, Y., Valenzuela-Fernández, L. A., & Garro-Aburto, L. L. (2019). Artificial Intelligence and Its Implications in Higher Education. *Journal of Educational Psychology-Propósitos y Representaciones*, 7(2), 553-568.
14. Ottestad, G., & Gudmundsdottir, G. B. (2018). Information and communication technology policy in primary and secondary education in Europe. *Second handbook of information technology in primary and secondary education*, 2, 1343-1362.
15. Petkovics, I. (2018). Digital transformation in higher education. *Journal of Applied Technical and Educational Sciences*, 8(4), 77-89.
16. Pettersson, F. (2021). Understanding digitalization and educational change in school by means of activity theory and the levels of learning concept. *Education and Information*

- Technologies, 26(1), 187-204.
17. Shanks, L. (2024). Accelerating Career Readiness: A Report on Career Innovations at APLU Institutions. Association of Public and Land-grant Universities.
 18. Sych, T. V., Khrykov, Y. M., & Ptakhina, O. M. (2021). Digital transformation as the main condition for the development of modern higher education. *Educational Technology Quarterly*, 2021(2), 293-309.
 19. Tomlinson, J., Baird, M., Berg, P., & Cooper, R. (2018). Flexible careers across the life course: Advancing theory, research and practice. *Human Relations*, 71(1), 4-22.
 20. Williams, R. T. (2024, January). The ethical implications of using generative chatbots in higher education. In *Frontiers in education* (Vol. 8, p. 1331607). Frontiers Media SA.