# A Scale Validation Study of University Students' Career Adaptation and Development in Esports Digital Learning Ecology

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***Abstract*—As esports emerges as a digital learning ecology that integrates technology and social interaction, its influence on university students' career development has become an increasingly important issue. Unlike prior studies that primarily focus on motivational factors, this study conceptualizes esports as a learning environment and examines students' career adaptation and development within this context. We utilized the University Students' Esports Career Adaptation and Development Questionnaire and incorporates three core dimensions, including career interest, career adaptability, and career readiness. Gender-related perspectives, such as stereotypes and self-efficacy, are further integrated to reflect the gendered nature of the esports ecosystem. We validated the scale using a sample of 133 university students, identifying a robust three-factor structure with high internal consistency (Cronbach's $\alpha$ = .939). The findings offer evidence-based insights for curriculum design and gender-inclusive career guidance in higher education.**

***Keywords*—esports, digital learning ecology, career adaptation, career development, scale validation**

## I. Introduction

### A. Research Background

As higher education undergoes a profound digital transformation, learning environments are progressively migrating from physical classrooms to hybrid digital spaces where technology and social interaction converge [1]. Within this paradigm shift, esports transcends its traditional entertainment role to function as a sophisticated digital learning ecology. This ecology compels students to navigate goal-oriented tasks, facilitate collaborative problem-solving, and undergo continuous skill adaptation, thereby offering a distinctive pedagogical nexus for career-related learning and professional development.

### B. Research Problem and Gap

Despite the institutional growth of esports programs, the academic empirical evidence of its impact on career trajectories remains scarce. Much of the current literature continues to conceptualize esports participation through lenses such as motivation, engagement, or potential behavioral risks [2–4]. While these studies provide insight into why students play, they often overlook how this participation translates into long-term career adaptation, leaving the link between esports and vocational development under-theorized.

### C. Research Purpose

To address this research gap, this study focuses on the validation of a measurement framework for examining university students' career adaptation and development within esports-related digital learning ecologies. Rather than evaluating the effects of esports participation perse, the primary purpose is to validate the University Students' Esports Career Adaptation and Development Questionnaire. Drawing on career construction theory and incorporating gender-sensitive perspectives [5, 6], this study seeks to provide a reliable instrument for assessing career-related adaptive resources and developmental processes situated in digitally mediated learning contexts.

## II. Literature Review

### A. Career Adaptation in Esports Learning Ecologies

Drawing on career construction theory, this study conceptualizes esports as a digitally mediated learning ecology in which students' career adaptation unfolds through continuous interaction with tasks, roles, and social expectations. Rather than viewing career development as a

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linear progression, esports learning environments require students to mobilize multiple adaptive resources in response to rapid industry change and uncertain career pathways.

Within this context, career adaptability reflects students' capacity to regulate learning and occupational transitions, particularly as esports-related careers lack standardized trajectories and formal organizational ladders [5, 7]. Career development readiness further captures students' self-directed planning and decision-making in navigating fragmented and emerging career opportunities [8]. In addition, career interest orientation functions as a motivational anchor that sustains engagement and persistence within highly competitive and unstable digital career fields [9, 10]. These three dimensions thus constitute an integrated model of career development within esports ecologies.

### B. Gender Perspectives in Esports-Related Career Development

Esports environments are not socially neutral spaces but are shaped by persistent gendered norms and power relations. Within such contexts, gender stereotypes and gender-related self-efficacy function as structural conditions that influence how students interpret their career possibilities and self-regulatory resources. Prior research suggests that participation in male-dominated digital communities often requires students to negotiate implicit expectations regarding competence, legitimacy, and belonging [11].

From a career development perspective, gender stereotypes operate as social-cognitive schemas that constrain or channel career interest exploration, while gender self-efficacy reflects individuals' perceived capacity to navigate and resist such constraints [12, 13]. Accordingly, this study integrates gender perspectives not as peripheral variables, but as integral components of students' career adaptation processes within esports-related digital learning ecologies.

## III. Methodology

### A. Participants

This study employed a cross-sectional survey design. Through convenience sampling, a total of 133 university students ($N$ = 133) majoring in or enrolled in esports-related courses were recruited. This sampling strategy ensured that participants possessed first-hand experience within the targeted digital learning ecology. The sample included students from different academic years and genders, reflecting the diversity of learners engaged in esports-related digital learning contexts in higher education.

### B. Instrument

The University Students' Esports Career Adaptation and Development Questionnaire was developed based on Career Construction Theory [7]. To ensure content validity, the initial item pool was reviewed by three experts in the fields of esports education and vocational psychology, leading to the final 23-item scale: (1) Career interest orientation (e.g., preference for esports professions); (2) Career adaptability (e.g., coping with industry changes); and (3) Career development readiness (e.g., planning maturity).

To capture the gendered nature of esports environments, items reflecting gender stereotypes and gender self-efficacy were embedded across these subscales to examine how gender-related social perceptions intersect with students' career interests, adaptability, and readiness. All items were rated on a 5-point Likert scale.

### C. Data Analysis

Data analysis was conducted following standard psychometric procedures using SPSS. First, descriptive statistics were computed to examine item distributions and overall response patterns. Second, item analysis was performed to assess item discrimination and preliminary internal consistency.

To examine the underlying factor structure and construct validity of the instrument, Exploratory Factor Analysis (EFA) was conducted using Principal Axis Factoring as the extraction method and Varimax with Kaiser Normalization as the rotation method. The suitability of the data for factor analysis was evaluated prior to extraction. Internal consistency reliability was assessed using Cronbach's alpha coefficients for each scale dimension. These analyses were undertaken to determine whether the empirical structure of the questionnaire aligned with the proposed theoretical framework.

## IV. Results

### A. Factor Structure

The EFA results indicated that the data were suitable for factor analysis (KMO = .89, Bartlett's Test $p < .001$). As presented in Table I, the analysis extracted three distinct factors. Factor 1 (Career Development Readiness) accounted for the largest variance, reflecting students' planning maturity and gender self-efficacy. Factor 2 (Career Adaptability) included items related to coping flexibility. Factor 3 (Career Interest Orientation) captured the intrinsic motivation and preference for esports professions.

TABLE I. Rotated Factor Matrix for the University Students' Esports Career Adaptation and Development Questionnaire (23 Items)

| Items | Item Statement | Factor 1 | Factor 2: | Factor 3: |
|---|---|---|---|---|
| | | Career Development Readiness | Career Adaptability | Career Interest Orientation |
| 1 | I enjoy using creative expression and design to attract others' attention. | - | - | .653 |
| 2 | I tend to take on the role of communication and coordination within a team. | - | - | .591 |

| Items | Item Statement | Factor 1 | Factor 2: | Factor 3: |
|---|---|---|---|---|
| | | Career Development Readiness | Career Adaptability | Career Interest Orientation |
| 3 | I am interested in creating visual, audio-visual, or interactive content. | - | - | .691 |
| 4 | I enjoy the experience of publicly presenting or showcasing my work. | - | - | .614 |
| 5 | My interest in certain esports roles would be higher if not for the influence of gender stereotypes. | - | - | .445 |
| 6 | I can maintain stable performance under pressure or tight deadlines. | - | .619 | - |
| 7 | When facing failure, I can quickly adjust my strategies and try again. | - | .528 | - |
| 8 | I actively seek out more efficient ways of working or learning. | - | .629 | - |
| 9 | I can handle multiple tasks simultaneously and manage my time effectively. | - | .613 | - |
| 10 | I can maintain a positive and proactive attitude when facing unknown challenges. | - | .583 | - |
| 11 | I can maintain focus and stability in highly demanding environments. | - | .751 | - |
| 12 | I know how to utilize limited resources to complete tasks. | - | .716 | - |
| 13 | When encountering gender-related bias or skepticism, I can adjust my strategies and remain committed. | - | .538 | - |
| 14 | I know where to seek support regarding gender equality issues. | - | .517 | - |
| 15 | I understand the primary job contents in the esports industry. | .794 | - | - |
| 16 | I understand the division of labor among different roles in the esports industry. | .808 | - | - |
| 17 | I actively collect industry information to expand my professional experience. | .512 | - | - |
| 18 | I am willing to participate in cross-disciplinary collaboration to expand my professional experience. | .707 | - | - |
| 19 | I have begun to plan possible pathways to enter the esports industry. | .608 | - | - |
| 20 | I will continuously update my knowledge to adapt to industry changes. | .633 | - | - |
| 21 | I believe I have the ability and potential to develop in the esports field. | .674 | - | - |
| 22 | I am willing to actively seek out industry mentors or experts to help me plan my career direction. | .518 | - | - |
| 23 | I actively seek out mentors, communities, or internship environments that support gender equality. | .426 | - | - |

Note: Only factor loadings ≥ .40 are reported. Extraction method: Principal axis factoring. Rotation method: Varimax with Kaiser normalization. KMO = .89; Bartlett's test of Sphericity was significant ($p < .001$).

### B. Reliability Analysis

Reliability analysis demonstrated excellent internal consistency for the overall scale, with a Cronbach's $\alpha$ coefficient of .939 for the final 23-item version. All subscales exceeded the commonly accepted threshold of .80, indicating robust reliability for assessing esports-related career adaptation and development.

## V. Discussion

### A. Educational Implications

This study provides empirical support for conceptualizing esports programs as complex digital learning ecologies that demand not only technical competence but also psychological and social adaptive resources. A striking observation concerns the integration of gender-related items across all three core dimensions of career adaptation and development. Rather than emerging as an isolated factor, issues of gender stereotypes and gender self-efficacy appear to be deeply embedded in how students evaluate their career interests, adaptability, and readiness for future pathways in the esports industry.

This finding suggests that, within gendered and male-dominated digital environments such as esports, career readiness is not solely a function of skill acquisition or planning maturity, but is also shaped by students' ongoing negotiation of industry norms, legitimacy, and self-perceived career viability [12, 14]. Accordingly, esports education that focuses exclusively on performance or technical training may overlook critical barriers influencing students' career confidence and long-term engagement. From an educational perspective, effective esports curricula should therefore incorporate forms of psychological and career-oriented support that address gendered expectations and stereotype-related concerns, particularly for students from underrepresented groups.

### B. Limitations and Future Directions

This study is subject to several limitations. First, the cross-sectional design restricts inferences regarding developmental change over time. Second, although the

sample size ($N$ = 133) is relatively small, it is considered adequate for the exploratory factor analysis conducted in this study, as supported by a high Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.89) and strong factor loadings (all ≥ .40). However, this sample size limits the broader generalizability of the findings. Future research may employ longitudinal designs to examine how career adaptability and readiness evolve across students' academic trajectories, as well as to further validate the instrument in diverse educational and cultural contexts.

## VI. Conclusion

This study validates a context-specific instrument for assessing university students' career adaptation and development within esports-related digital learning ecologies. By operationalizing career adaptability, interest orientation, and development readiness in a gender-sensitive manner, the findings extend career construction perspectives into participatory digital learning environments. The results highlight the importance of considering gendered experiences as integral to students' career readiness in esports education, providing a foundation for future research and evidence-informed curriculum design in emerging digital career fields.

## Conflict of Interest

The authors declare no conflict of interest.

## Author Contributions

T.Y.C. conducted the research and prepared the manuscript; H.M.W. supervised the research process; H.C.L. contributed to the study conception and design; and L.H.K. provided professional expertise and co-supervised the study. All authors had approved the final version.

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## References

[1] J. Tang, P. Huang, and S. Yan, "Digital transformation in higher education: Logical framework, practical dilemmas, and implementation approaches," *Frontiers in Psychology*, vol. 16, 2025. https://doi.org/10.3389/fpsyg.2025.1565591

[2] Z. İ. Erdoğmuş, G. Esen, and M. Karakaya Arslan, "Online esports engagement: Motivational antecedents and marketing outcomes," *Athens Journal of Sports*, vol. 10, no. 3, pp. 145–162, 2023. https://doi.org/10.30958/ajspo.10-3-2

[3] I. Palmi, S. Pichini, and R. Solimini, "eSports: A new challenge for public health protection?" *Public Health Reports*, 00333549251387939, 2025. https://doi.org/10.1177/00333549251387939

[4] A. Zaib Abbasi, N. Alqahtani, R. H. Tsiotsou, U. Rehman, and D. Hooi Ting, "Esports as playful consumption experiences: Examining the antecedents and consequences of game engagement," *Telematics and Informatics*, vol. 77, 101937, 2023. https://doi.org/10.1016/j.tele.2023.101937

[5] A. Alkal, "Relationships among resilience, career adaptability and career decision self-efficacy in university students: A two-wave longitudinal mediation study," *BMC Psychology*, vol. 13, no. 1, 1146, 2025. https://doi.org/10.1186/s40359-025-03456-8

[6] W. Ouyang, X. Shu, and R. Fu, "How career adaptability affects university students' job search behavior and subjective well-being: The role of career choice optimistic bias," *BMC Psychology*, vol. 13, no. 1, 1290, 2025. https://doi.org/10.1186/s40359-025-03652-6

[7] M. L. Savickas and E. J. Porfeli, "Career adapt-abilities scale: Construction, reliability, and measurement equivalence across 13 countries," *Journal of Vocational Behavior*, vol. 80, no. 3, pp. 661–673, 2012. https://doi.org/10.1016/j.jvb.2012.01.011

[8] J. Ni, J. Zhang, Y. Wang, D. Li, and C. Chen, "Relationship between career maturity, psychological separation, and occupational self-efficacy of postgraduates: Moderating effect of registered residence type," *BMC Psychology*, vol. 11, 246, 2023. https://doi.org/10.1186/s40359-023-01261-9

[9] K. A. Hoff, Q. C. Song, C. J. M. Wee *et al*., "Interest fit and job satisfaction: A systematic review and meta-analysis," *Journal of Vocational Behavior*, vol. 123, 103503, 2020. https://doi.org/10.1016/j.jvb.2020.103503

[10] J. L. Holland, "Making vocational choices: A theory of vocational personalities and work environments," *Psychological Assessment Resources*, 1997.

[11] Y. Tong, M. Zhong, J. Yang *et al*., "The influence of self-efficacy on career maturity in college students: Mediating the moderation of creativity tendency and achievement motivation," *Frontiers in Psychology*, vol. 16, 1585195, 2025. https://doi.org/10.3389/fpsyg.2025.1585195

[12] B. Kordyaka, L. Pumplun, M. Brunnhofer, B. Kruse, and S. Laato, "Gender disparities in esports–An explanatory mixed-methods approach," *Computers in Human Behavior*, vol. 149, 107956, 2023. https://doi.org/10.1016/j.chb.2023.107956

[13] C. Yeomans, A. Karg, R. Storr, K. Symons, and D. Purser, "Esport social capital: An avenue to develop social connection and subjective wellbeing," *Leisure Sciences*, pp. 1–20, 2025. https://doi.org/10.1080/01490400.2025.2500338

[14] J. Borkowski, N. Besombes, and G. Cabagno, "The construction of esports careers in France: Are there gender-based inequalities right from the start?" *International Review for the Sociology of Sport*, vol. 60, no. 5, pp. 982–1002, 2025. https://doi.org/10.1177/10126902241290042