



A Needs Analysis of Educational Content for Overseas Job Applicants in the Digital Bio-health Industry

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Article Info

Received August 3, 2023

Revised August 12, 2023

Accepted August 12, 2023

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Key Words

Curriculum

Digital technology

Education

Health services

Background: The globalization of the healthcare industry and the increasing demand for skilled professionals in the global healthcare industry have opened up opportunities for specialized biotech healthcare professionals to seek overseas employment and career advancement.

Objects: This study aimed to develop educational content essential for the overseas employment of digital bio-health professionals.

Methods: A survey was conducted among 196 participants. Google Forms (Google) were utilized to create and administer the survey, employing purposive sampling, a non-probability sampling method. Data analysis was performed using IBM SPSS 25.0 (IBM Co.), including Cronbach's α and independent sample t-tests to assess significant differences.

Results: About half of college students are interested in overseas employment and international careers, while the other half had not. The most common reason for wanting to work or go overseas was "foreign experience will be useful for future activities in Korea." Students who had experience taking courses from the Bio-health Convergence Open Sharing University preferred overseas programs more than those who did not have that experience. In terms of the degree of desire for overseas education courses provided by universities, contents related to human health were the highest, followed by bio-health big data.

Conclusion: Many students wanted to work and go overseas if there is sufficient support from the university. The findings in this study suggest that universities are necessary to play an important role in supporting students' aspirations to work or go overseas by providing language education, education and training programs, information on overseas jobs, and mentoring programs.

INTRODUCTION

The bio-health industry aims to enhance human health and prevent diseases, and it stands as the fastest-growing future industry. This sector encompasses both manufacturing (medical equipment, infectious disease diagnostic kits, therapeutics, etc.) and service industries (healthcare services, etc.) based on knowledge from fields like medicine, pharmacy, and bio-technology [1]. Recent outbreaks of global infectious diseases like COVID-19 have contributed to the rapid proliferation of the bio-health industry [2-4]. Furthermore, the 4th industrial revolution's advancements in information and communication technology are driving the digital transformation of the bio-

health market [5,6]. According to Global Industry Analysts, the global digital healthcare industry was valued at \$216.5 billion in 2022 and is projected to reach \$857.2 billion by 2030 [7]. Major developed countries are investing in related systems, and digital bio-health companies are continuously hiring skilled professionals, indicating a sustained growth trend. In line with this, the Korean government innovated 'Bio-health New Industry Regulatory' in 2023 to foster the continual growth of the digital bio-health industry [8].

In Korea, the bio-health industry actively explores digital transformation technologies such as big data and artificial intelligence, leveraging their IT competencies. Consequently, digital transformation is occurring across various domains,



including product design, concept verification, clinical trials, and field tests [9]. As a result, incorporating digital technologies like AI, IoT, and cloud computing in bio-health curricula has become crucial in recent years [10]. Moreover, the importance of international collaboration in the healthcare sector is on the rise, leading to active intergovernmental consultations and private exchanges. Amidst these changes, the demand for global healthcare professionals is steadily increasing. To promote overseas employment, customized employment strategies tailored to each country's characteristics and individual characteristics, as well as customized education for aspiring overseas job seekers, are imperative.

The objective of this study is to gauge the level of intention among college students majoring in bio-health fields to work or go overseas in the realm of digital bio-health. The study focuses on three research questions and aims to identify the appropriate global educational content that universities should support to expand the pool of healthcare professionals and contribute to the global bio-health industry's changing trends.

MATERIALS AND METHODS

1. Study Participants

The survey involved a total of 196 students from Woosong University, representing various departments, including Nursing, Emergency Medical Service, Physical Therapy, Occupational Therapy, Sports Science & Rehabilitation, Speech Language Therapy and Aural Rehabilitation, Social Welfare, Fire and Disaster Protection Engineering, and Health Care Management. Additionally, some non-health related students who took Sharing University courses also participated.

2. Data Collection

Google Forms (Google) were utilized to create and administer the survey, employing purposive sampling, a non-probability sampling method. The participants were provided with clear instructions and the purpose of the questionnaire before proceeding to answer it through self-administration [11-13].

3. Data Analysis

The data of this study were analyzed using the IBM SPSS 25.0 (IBM Co.) program as follows. First, Cronbach's α was calculated to check the reliability of each measure used in the study. Second, frequency analysis was performed to obtain an understanding of the general characteristics of the study participants and their intention regarding overseas employment and international careers. Descriptive statistical analysis was then carried out to understand the level of the research variables. Third, an independent sample t-test was performed to investigate potential differences in the research variables based on the characteristics of the study participants. The statistical significance was determined based on the significance level of 5%.

4. Reliability

To evaluate the reliability of the main variables in this study, Cronbach's alpha coefficient was calculated. A Cronbach's alpha coefficient of 0.60 or higher is generally considered indicative of good internal consistency among the scale items. In this study, all variables exhibited a Cronbach's alpha coefficient of 0.60 or higher, demonstrating satisfactory reliability (Table 1).

RESULTS

1. Study Participants

1) General characteristics

The study included 97 (49.5%) males and 99 (50.5%) females participants. Among them, 67 (34.2%) were in the first grade, 46 (23.5%) in the second grade, 62 (31.6%) in the third grade, and 21 (10.7%) in the fourth grade.

2) Experiences with courses

Out of the participants, 92 (46.9%) had prior experience in Bio-health Convergence Open Sharing University, while 104 (53.1%) had not.

Table 1. The reliability of the main variables in the study

Variable	Number of question	Mean \pm SD	Cronbach's α
Intention to work and go abroad	6	3.34 \pm 1.00	0.942
Preparing for overseas employment and international career	13	2.74 \pm 0.74	0.916

Mean \pm SD, mean \pm standard deviation.

2. Intention for Overseas Employment and International Careers

1) Intention to go abroad

Regarding their aspirations to work or go overseas, 92 (46.9%) responded affirmatively with “hope,” while 104 (53.1%) indicated “do not hope.”

2) Reasons for wanting to work and go abroad

The average score for “foreign experience will be useful for

future activities in Korea” was the highest at 4.37, and the lowest score was 3.02 for “I think it’s not easy to get a job or start a business in Korea” (Table 2).

3) Reasons for not wanting to work or go abroad

The highest average score was for “because I am not confident in a foreign language” at 3.91, while the lowest score was for “because people around will oppose” at 2.36 (Table 3).

Table 2. Descriptive statistics of reasons for wanting to work and go abroad

Item	Mean ± SD
Because the industry that I majored is competitive overseas	3.93 ± 0.90
Because I want to have an experience working abroad	4.33 ± 0.66
Because it can be an opportunity to learn a foreign language	4.28 ± 0.72
Because of wanting to live abroad	3.80 ± 1.04
Because of opportunities of earning more money	3.96 ± 0.86
Because work environments are good	4.00 ± 0.89
Because living conditions in foreign countries are better	3.52 ± 0.94
Because I think there will be potential for development	4.28 ± 0.77
Because I think it’s not easy to get a job or start a business in Korea	3.02 ± 1.04
Because I think my foreign experience will help me in my activities in Korea in the future	4.37 ± 0.74

Mean ± SD, mean ± standard deviation.

Table 3. Descriptive statistics of reasons for not wanting to work and go abroad

Item	Mean ± SD
Because I haven’t thought about it at all	3.44 ± 1.06
Because I have to be away from my family	3.35 ± 1.10
Because people around will oppose	2.36 ± 1.08
Because it is difficult to adapt living abroad	3.60 ± 1.10
Because I am not confident in a foreign language	3.91 ± 1.06
Because I think the work is going to be hard	2.97 ± 0.99
Because I am not sure my income security	3.02 ± 1.11
Because there is no guaranteed career when returning to Korea	2.92 ± 1.19
Because of economic reasons such as the cost of moving abroad in the beginning	3.55 ± 1.07
Because it is enough to get a job or start a business in Korea	3.66 ± 0.97
Because it is difficult to get a license and certification abroad again	3.56 ± 1.06

Mean ± SD, mean ± standard deviation.

Table 4. Differences in the degree of desire for overseas programs by the experience of taking classes at the Bio-health Convergence Open Sharing University

Item	Experience of taking course	n	Mean ± SD	t	p-value
Digital Bio-health Convergence Open Sharing University “Joint Degree”	Yes	92	3.26 ± 0.97	3.023**	0.003
	No	104	2.89 ± 0.68		
Digital Bio-health Convergence Open Sharing University “Double Major”	Yes	92	3.26 ± 1.03	2.773**	0.006
	No	104	2.90 ± 0.73		
Digital Bio-health Convergence Open Sharing University “Minor”	Yes	92	3.25 ± 1.01	2.012*	0.046
	No	104	2.99 ± 0.76		
Digital Bio-health Convergence Open Sharing University “Micro Degree”	Yes	92	3.08 ± 0.93	2.610*	0.010
	No	104	2.77 ± 0.71		

Mean ± SD, mean ± standard deviation. *p < 0.05, **p < 0.01.

3. Demands for Global Education Curriculum and Contents

1) Differences in preference for overseas programs by the experience of taking the Bio-health Convergence Open Sharing University's courses

Students from all degree programs ("joint degree," "double major," "minor," and "micro degree") demonstrated a higher demand for overseas programs when they had prior experience taking the Bio-health Convergence Open Sharing University's courses, as compared to those who did not (Table 4).

2) Descriptive statistics of demands for overseas education courses provided by universities

The highest average score was for "human health-related content" at 3.26, and the lowest was 2.82 for "two-dimensional illustrator-related content" (Table 5).

4. Intention of Overseas Employment and International Careers and University's Support

1) Descriptive statistics of the intention of overseas employment and international careers

The average score for "willing to work and go overseas if support is provided at the university level" was 3.64, whereas "intention to work and go overseas using a major after graduation"

had the lowest score at 3.15 (Table 6).

2) Demands for support programs for overseas employment and international careers

"Language education program" ranked first (n = 91, 46.4%), followed by "education and training programs by job field" (n = 34, 17.3%), and "providing information on various overseas job" ranked third (n = 34, 17.3%) (Table 7).

DISCUSSION

Bio-health Convergence Open Sharing University, has been making efforts to cultivate a bio-health workforce tailored to industry needs by developing and offering various courses over the past two years. However, as the current curriculum is primarily based on domestic demand, there is a need to enhance its composition and support to facilitate global expansion. To address this, it is crucial to develop content that supports bio-health professionals in pursuing overseas employment and international careers, based on a well-planned multi-year strategy. Prior to formulating the detailed plan, a survey was conducted, focusing on three research questions, to gain insights into the needs and aspirations of students.

Table 5. Descriptive statistics of the degree of desire for overseas education courses provided by universities

Item	Mean ± SD
Three-dimensional convergence media-related content	2.86 ± 0.94
Two-dimensional illustrator-related content	2.82 ± 0.97
Wearable-related content	2.95 ± 0.97
Content related to immersive device	2.97 ± 0.98
Human health-related content	3.26 ± 0.91
Bio-health big data-related content	2.99 ± 0.98
Bio-health software-related content	2.95 ± 0.97

Mean ± SD, mean ± standard deviation.

Table 6. Descriptive statistics of intention for overseas employment and international career

Item	Mean ± SD	Ranking
Before entering my current major, I have thought about using my major to work abroad and go abroad	3.16 ± 1.21	5
While majoring in the department, I have thought about using my major to work and advance abroad	3.25 ± 1.20	4
After graduation, I have an intention to use my major to work and go abroad	3.15 ± 1.16	6
If it becomes difficult to enter society using my major after graduation, there is a desire to work and go abroad	3.41 ± 1.09	3
If there is support at the university level, I have intention to work and go overseas	3.64 ± 1.08	1
I am willing to participate in a overseas employment program offered by the university	3.42 ± 1.04	2

Mean ± SD, mean ± standard deviation.

Table 7. Desired support programs for overseas employment and international career

Item	Ranking # 1	Ranking # 2	Ranking # 3
Language education program	91 (46.4)	32 (16.3)	19 (9.7)
Education and training programs by job field	10 (5.1)	34 (17.3)	30 (15.3)
Providing information on various overseas job	16 (8.2)	28 (14.3)	34 (17.3)
Mentoring program with diverse overseas experience	16 (8.2)	31 (15.8)	27 (13.8)
Information on the culture of the country they hope to go	8 (4.1)	11 (5.6)	14 (7.1)
Overseas internship program	36 (18.4)	33 (16.8)	30 (15.3)
Overseas job fair	10 (5.1)	7 (3.6)	15 (7.7)
Cover letter/resume writing and interview tip	3 (1.5)	15 (7.7)	15 (7.7)
Career-related individual and group counseling	6 (3.1)	5 (2.6)	12 (6.1)

Values are presented as number (%).

1. Research Question (1): Do Students in the College of Health and Welfare Want to Work or Go Overseas?

The findings indicate that about half (47%) of the participants expressed a desire to work or go overseas. Among the reasons for their aspirations, the most common one was the belief that “foreign experience will be useful for future activities in Korea,” followed by “the desire to have an experience working abroad” [14]. Notably, “wanting to live abroad” ranked 8th out of 10 options, suggesting that their interest in going abroad is primarily driven by career opportunities rather than a mere desire to reside in another country. The third and fourth most cited reasons were “opportunity to learn a foreign language” and “potential for development,” further supporting this observation.

On the other hand, among the students who did not want to go abroad, the most frequently mentioned reason was “lack of confidence in foreign language,” followed by concerns about “difficulty adapting to living abroad.” In essence, most students who were hesitant about going overseas were worried about their language proficiency and ability to adjust to a foreign environment, causing them to approach the decision with caution rather than outright rejection. This is also supported by the fact that “I haven’t thought about it at all” ranked sixth lowest out of 11 options, suggesting some level of consideration.

2. Research Question (2): Is the Global Education Curriculum and Content Appropriately Structured for Overseas Employment and International Careers?

There was a statistically significant difference in the desire for “joint degree,” “double major,” “minor,” and “micro degree”

in the digital Bio-health Convergence Open Sharing University, depending on whether students had taken classes at the Bio-health Convergence Open Sharing University. Those who had previous course experiences showed a higher desire for such programs. However, it is challenging to ascertain whether this increased desire is solely due to their exposure to bio-health-related information through shared university courses or if students with a high interest in the bio-health field were naturally inclined to pursue this curriculum.

Regarding the preference for overseas curriculum, the highest preference was given to “human health-related content.” Following that, there was a considerable preference for “bio-health big data-related content,” as well as “device-related content” (immersive device-related content, wearable device-related content). This can be interpreted as a reflection of recent trends in the Fourth Industrial Revolution.

3. Research Question (3): Is the University’s Support for Employment and Going Abroad Appropriate?

A majority of the participants responded positively, stating that they would be “willing to work or go abroad if there is support at the university level.” The second-highest response was “willing to participate in an overseas employment program implemented by the university.” As observed in Research Question (1), among those who did not want to go overseas due to reasons like “lacking confidence in foreign language skills” or “struggling to adapt to foreign environments,” the “language education program” emerged as the most desired support program for overseas employment and international careers. While many survey participants expressed an interest in going abroad, various factors, such as lack of preparation or unfamiliarity with foreign environments, posed as obstacles. Therefore, universities must provide appropriate support to

ensure that students do not impose limits on their aspirations.

CONCLUSIONS

This study aimed to explore the needs of college students majoring in health and welfare regarding overseas work opportunities and careers in the digital bio-health field. Additionally, it aimed to identify the global educational content required to effectively support these needs. The results indicate that a significant portion of the participants aspired to go abroad if there is university-level support, with language proficiency, adaptation processes, and economic considerations emerging as important factors influencing the demand for overseas employment. Understanding the intentions and needs of college students is expected to contribute to the development of the bio-health industry and play a pivotal role in cultivating a competent workforce in the healthcare field.

FUNDING

This study was supported by the 2022 Woosong University Academic Research and the Bio-health Convergence Open Sharing System through the National Research Foundation funded by the Ministry of Education.

ACKNOWLEDGEMENTS

This study is a part of the research project of the Woosong Bio-health Convergence Open Sharing System.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this study was reported.

AUTHOR CONTRIBUTIONS

Conceptualization: WL. Data curation: SL. Formal analysis: SL. Funding acquisition: SL. Investigation: SL. Methodology: SL. Project administration: WL. Resources: WL. Software: SL. Supervision: WL. Validation: SL. Visualization: WL. Writing - original drafting: SL. Writing - review and editing: WL.

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