

# Job Analysis of Korean Horticultural Therapists for Developing Specialized Training Using Developing a Curriculum Method

Kyu Jin Kang<sup>1</sup>, A-Young Lee<sup>2</sup>, and Sin-Ae Park<sup>1,3,4</sup>

**KEYWORDS.** DACUM chart, future requirements, performance level, professional curriculum design, training requirement.

**ABSTRACT.** To align with global trends and the swift pace of technological advancements, it is imperative to consistently update the professional standards and curriculum for horticultural therapists to meet evolving professional demands. This study used the developing a curriculum (DACUM) method to analyze the tasks and duties of Korean horticultural therapists and subsequently tailor a specialized training program for them. First, 11 experts in the horticultural therapy field participated in workshops to develop a DACUM chart that included the definitions, tasks, knowledge, skills, and attitudes of horticultural therapists. A job performance evaluation survey for horticultural therapists was also developed through these workshops. The 300 participants of the online survey were members of the Korea Horticultural Therapy and Welfare Association. The survey consisted of a 5-point Likert scale of the current performance level and future requirement level for each qualification grade. Demographic information and responses to each question were computed using a frequency analysis and percentages, grade-specific task performance evaluations comprised a one-way batch analysis of variance, and statistical significance levels were set to  $P < 0.05$ . The horticulture professional curriculum was based on competencies derived from the job analysis and online conferences with 10 professionals who participated in the DACUM workshops. The job analysis results revealed six duties with a total of 32 tasks. The results of the job performance evaluation showed that there was a great demand for the development of their convergence capabilities. Accordingly, in response to these results, new interdisciplinary convergence fields such as horticultural therapy and science (information technology), horticultural therapy, and humanities education were introduced into the specialized training. The results of this study will be valuable for improving the skills and expertise of horticulture therapists to meet social needs.

The global significance of human biophilia has been prominently emphasized during the coronavirus disease 2019 (COVID-19) pandemic, as evidenced by the notable surge in the acquisition of horticultural plants and active engagement in horticultural activities (Behe et al. 2022; Zhang and Li 2023). These green experiences, including horticultural activities, have played a vital and multifaceted role in preserving and promoting human health amid challenging circumstances (Zhang and Li 2023).

A horticultural therapist is defined as a professional in the field of complementary and alternative medicine (CAM) who uses plants and horticultural activities to develop and provide therapeutic interventions suitable for clients with specific goals (Son et al. 2016). CAM comprises a diverse range of medical and healthcare systems, practices, and products that are not

currently considered part of conventional medicine (National Center for Complementary and Alternative Medicine, 2021). In the United States, horticultural therapists are viewed as allied health professionals or another form of creative arts therapists (Stowell et al. 2021). This profession has spread globally, and horticultural therapy is practiced in various places, including North America, South America, Europe, and Asia. The American Horticultural Therapy Association was established in 1973 to support the education and professional development of horticultural therapists; as of 2020, there were 486 registered horticultural therapists in the United States (Stowell et al. 2021). Similarly, in South Korea, the Korea Horticultural Therapy Welfare Association (KHTA) has been providing education and private qualifications for horticultural therapists since the late 1990s. As of 2023, the

number of horticultural therapists registered with the association was 6155 (KHTA 2023).

Despite efforts to develop horticultural therapy as a recognized profession with professional qualifications, it is still considered an emerging field in many countries, including the United States and South Korea (Shoemaker and Diehl 2012).

To further advance horticultural therapy as a therapeutic profession, Stowell et al. (2021) emphasized the need for various initiatives, including the active involvement of professional associations, the establishment of specialized training programs, and the need for marketing and networking strategies to raise awareness of horticultural therapy, research endeavors to enhance professional treatment skills, securing funding opportunities, and expanding job opportunities.

Notably, the design of vocational standards and curriculum through job analysis can serve as an institutional framework for awarding nationally recognized professional qualifications (Tütlys and Spoettl 2017). Job analysis, as an essential technique used for developing specialized curricula, involves a series of processes aimed at analyzing a specific job, identifying the necessary actions for job performance (Cascio 1998), and delineating the tasks performed by individuals in that field (Oh and Choi 2005). Previous studies conducted by Starling et al. (2014) in the United States and Kim et al. (2014) in Korea have contributed to establishing and progressing vocational training courses based on job analysis.

However, recent research conducted by Stowell et al. (2021) has indicated that horticultural therapists in the United States highlight the importance of developing more specialized training and implementing a range of degree and graduate programs based on this curriculum. Similarly, Yoo (2016) emphasized the necessity for professional curriculum development and continuous education to enhance job competency in South Korea.

Horticultural therapists in South Korea are classified into levels 1, 2, and 3, based on specific requirements. These requirements encompass the completion of education, clinical practice,

workshops, written examinations, thesis presentations, and more (KHTA 2023). For level 3, there are no educational background restrictions, but individuals must complete training, pass a written examination, and actively participate in clinical trials and workshops. These workshops can consist of either 60 sessions or 40 h; alternatively, 30 sessions and 20 h are considered as well. To attain level 2, candidates should possess a bachelor's degree or higher, complete training, pass a written examination, engage in clinical trials (60 sessions), participate in workshops (20 h), and present a thesis (once). To attain level 1, candidates must first achieve level 2 and subsequently fulfill additional criteria, including completing three medical subjects or graduating from a bachelor's or graduate program specializing in horticultural therapy, passing a written examination, participating in extensive clinical trials (200 sessions), engaging in workshops (40 h), publishing papers (two), and receiving supervision (once). Currently, the KHTA offers specialized training to become level 2 and level 3 horticultural therapists. However, a specialized job curriculum is required to train level 1 horticultural therapists (KHTA 2023).

Received for publication 14 Aug 2023. Accepted for publication 6 Dec 2023.

Published online 23 Jan 2024.

<sup>1</sup>Department of Bio and Healing Convergence, Graduate School, Konkuk University, Seoul 05029, Korea

<sup>2</sup>Department of Horticulture and Landscape Architecture, National Taiwan University, Taipei 10617, Taiwan

<sup>3</sup>Department of Systems Biotechnology, Konkuk Institute of Technology, Konkuk University, Seoul 05029, Korea

<sup>4</sup>Korean Horticultural Therapy and Well-being Association, Seoul 05066, Korea

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

K.J.K. and A.-Y.L. contributed equally to this work.

This paper was supported by the KU Research Professor Program of Konkuk University.

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (2022R1A2C1012553).

S.-A.P. is the corresponding author. E-mail: sapark42@konkuk.ac.kr.

This is an open access article distributed under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.21273/HORTECH05301-23>

Empirical research has demonstrated the diverse and substantial impact of horticulture therapy on various dimensions of well-being encompassing physical, psycho-emotional, cognitive, social, educational, and behavioral modification outcomes (Park et al. 2016). Given the enduring relevance of these experiences, green experiences are anticipated to play an indispensable role in the preparation for future pandemics and postpandemic scenarios.

Although concerns persist regarding potential job displacement resulting from technological advancements, such as the use of artificial intelligence, professions that entail direct human interaction and personalized treatment, such as horticultural therapists, are not expected to face significant challenges (Huang and Rust 2018). As a result, an increase in demand for horticultural therapists who provide human-centered services focused on green experiences is projected. To adapt effectively to rapidly evolving global trends and technologies, it is important to update professional standards and curricula in line with the evolving educational needs of horticultural therapists. Thus, during our study, we performed the task of updating the specialized training curriculum through a comprehensive job analysis survey conducted by an expert group and a meticulous evaluation of job performance by practitioners using the developing a curriculum (DACUM) method.

## Materials and methods

DACUM is a widely used job analysis method for creating vocational curricula (Hesse 1989). It is used internationally to analyze job roles across various occupations. DACUM involves the systematic process of identifying the essential tasks and responsibilities required for a specific job in a relatively short time and at a reasonable cost. This method effectively develops a DACUM chart that accurately represents the job requirements. This study consisted of the following three analysis stages: deriving the duties and tasks of horticultural therapists through the workshops of the DACUM committee; analysis of the educational needs of practitioners through a job performance survey; and development of specialized training based on the results obtained from stages 1 and 2. The survey was conducted with the approval of

Konkuk University's Research Ethics Committee (7001355-201910-HR-343).

**DACUM COMMITTEE AND JOB ANALYSIS.** For the job analysis, a DACUM committee consisting of 11 Korean horticultural therapy experts (four men and seven women) was formed based on the panel selection criteria (Norton and Moser 2008; Oh and Choi 2005). Among the committee members, seven were university professors specializing in horticultural therapy and four were clinical experts in horticultural therapy (three supervisors and one with a level 1 qualification). Additionally, the committee included a workshop facilitator from the Korea Industrial Human Resources Corporation, as well as one recorder (PhD program student at Konkuk University) and one observer (master's degree program student at Konkuk University). The selection criteria included individuals who possess excellent technical skills for the job (those with >5 years of clinical experience), are employees of official higher education institutions or associations (e.g., university professors or association executives), and are full-time employees in clinical fields. A 2-d DACUM workshop was conducted at Konkuk University in 2020; during that time, the committee identified the definitions, duties, tasks, and required competencies of horticultural therapists. After the workshop, the committee validated the job analysis through two online meetings and finally developed the resulting DACUM chart.

**DEVELOPMENT OF A SURVEY TO EVALUATE JOB PERFORMANCE.** To assess the performance of horticultural therapists, a job performance assessment survey was developed. The survey items consisted of "current performance levels" and "future requirement levels" based on the DACUM chart, each with responses based on a 5-point Likert scale. The questionnaire used during this study comprised a total of 39 questions, including 7 questions to collect demographic information and 32 questions about horticultural therapists' tasks related to the participants' current work performance level and future demand level. This survey had a total of six subcategories as horticultural therapist duties: horticultural therapy program preparation; horticultural therapy program plan; horticultural therapy program execution;

management; self-development; and convergence with other disciplines competency development. To verify the reliability of the evaluation results of the horticultural therapist job performance assessment, the reliability coefficient of Cronbach's alpha for current and future performance levels was calculated. The results showed that the current performance level was 0.948, and that the future requirement level was 0.964. Furthermore, an investigation was conducted to examine the educational requirements of horticultural therapists concerning their current and future work performance.

**PARTICIPANTS OF THE SURVEY TO EVALUATE JOB PERFORMANCE.** This study administered an online questionnaire to a sample of 1882 horticultural therapists who were registered members of the KHTA. Of the total sample, 300 participants responded, leading to a response rate of 16%. Most respondents (89.7%;  $n = 269$ ) were female, and a significant proportion was middle-aged (individuals in their 40s or older; 93.6%;  $n = 281$ ). Furthermore, 73.0% ( $n = 219$ ) of the participants had a level 2 qualification in horticultural therapy, and 64.9% ( $n = 195$ ) of the participants had less than 5 years of experience.

**DATA PROCESSING AND ANALYSIS.** The data analysis used statistical software (IBM SPSS Statistics version 25.0; IBM Corp., Armonk, NY, USA) to compare the duties of horticultural therapists. The collected data were analyzed using frequency and percentage calculations to determine the respondents' demographic information. To assess the horticultural therapists' current performance level and future level of demand, a  $t$  test was conducted by calculating the mean and  $SD$ . The  $t$  test was also used for the degree of work performance according to the qualification level, and Duncan's test was used as a post hoc test. The confidence coefficient of Cronbach's alpha was obtained to determine the reliability of the evaluation. The statistical significance level was 5% ( $P < 0.05$ ). The education requirements were analyzed using the Borich Priority Formula (Borich 1980). The Borich Priority Formula accounts for the discrepancy between the current and desired levels and assigns weights to each factor. This prioritization approach allows for a more accurate understanding of the

actual needs in terms of education and training (Borich 1980).

$$\text{Borich's needs} = \frac{\sum (RCL - PCL) \times \overline{RCL}}{N}$$

where  $RCL$  (required competency level) is each individual's importance score,  $PCL$  (present competency level) is each individual's performance score,  $\overline{RCL}$  is the average score of importance by each competency, and  $N$  is the total number.

**DESIGN OF COMPETENCY-BASED CURRICULUM.** The National Center for Education Statistics of the US Department of Education (2001) defines competency as "the combination of skills, abilities, and knowledge needed to perform a specific task." A competency-based curriculum focuses on how learners acquire and demonstrate the necessary knowledge, skills, and attitudes rather than solely on the tasks they need to learn (Chyung et al. 2006; Naquin and Holton 2003).

To develop a competency-based horticultural therapy curriculum, a 2-hour committee meeting was conducted based on the findings of the DACUM committee and the practitioners' survey. Because of the COVID-19 pandemic restrictions for meetings, the meeting was conducted via video conference. It was structured into the following three stages: selection of core tasks; derivation of competencies and components; and curriculum design.

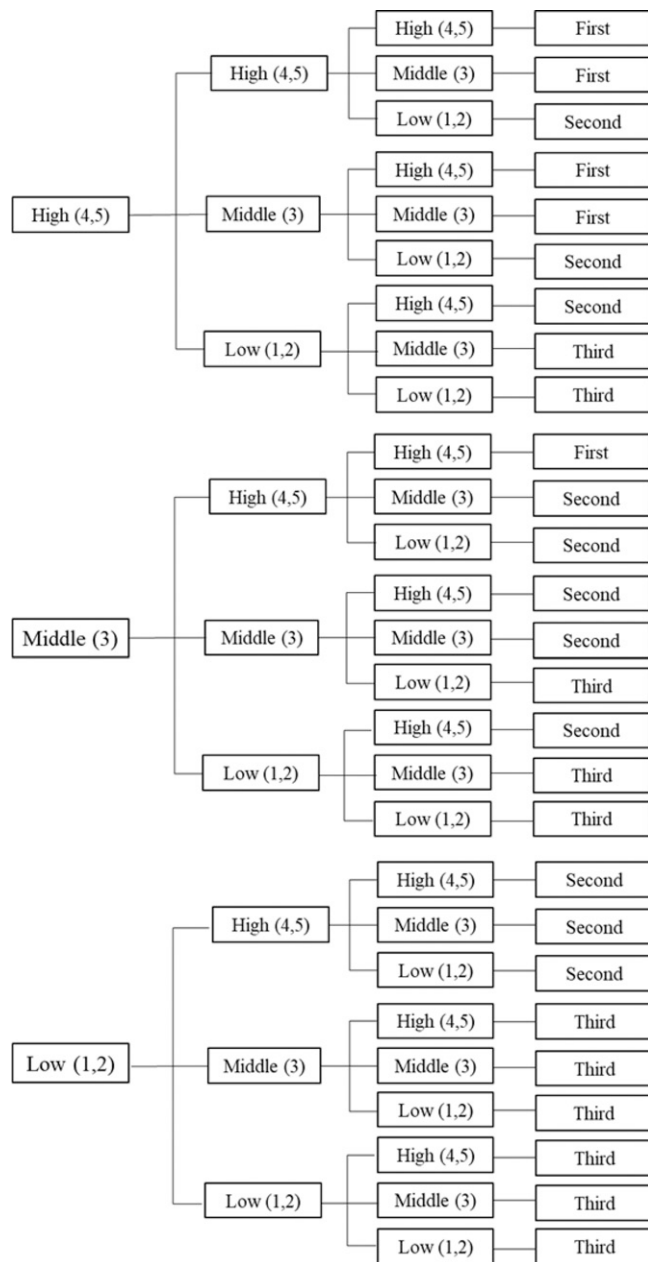
To select core tasks, a task-level evaluation was undertaken. The committee members used the training prioritization tool (Park et al. 2005), which comprehensively considers the importance, difficulty, and frequency of each task. To assess the importance of each task, participants used a scale ranging from 1 (indicating that the task was not important at all) to 5 (signifying that the task was of very high importance). To evaluate the difficulty of the tasks, participants rated the level of difficulty using the following scale: 1, indicating that the task was very easy; 2, signifying slightly easy; 3, denoting an average level of difficulty; 4, representing a task that was somewhat difficult; and 5, indicating that the task was very difficult. In terms of the frequency of task performance, participants used the following 5-point scale: 1, representing tasks performed more than once per year to less than once every 6 months;

2, indicating tasks performed more than once every 6 months to less than once every 2 or 3 months; 3, denoting tasks performed more than once every 2 or 3 months to less than once per month; 4, signifying tasks performed more than once per month to less than once per week; and 5, representing tasks performed more than once per week. The evaluation was conducted using a 5-point Likert scale, with scores of 1 and 2 indicating low priority, 3 indicating medium priority, and 4 and 5 indicating high priority. The final priority was established by evaluating the importance, difficulty, and frequency scores of each task step systematically (Fig. 1). The average score for each item was rounded and classified as a number ranging from 1 to 5.

To derive competencies for the selected core tasks, the committee members identified and classified each task's required knowledge, skills, and attitudes (KSA). To identify the competencies of horticultural therapists, we used the affinity diagramming thematic analysis approach to code the extensive information gathered during workshops of the committee and organized it into topic-based categories (Scupin 1997). After the meeting, a review stage was conducted through continuous e-mail exchanges to end the competencies. For instance, to address the research question, "What competencies and corresponding KSA are essential for horticultural therapists?", the researcher analyzed the collected data using participant observations. Then, data were coded and condensed considering factors such as frequency, sequence, or causality and organized into categories to generate competencies and KSA of horticultural therapist as the research findings. Finally, the specialized training design involved selecting suitable subjects to develop and align each competency (Fig. 2).

## Results and discussion

**DACUM JOB ANALYSIS.** A horticultural therapist was defined as an expert who improves the quality of life by improving psychological, physical, educational, and social health through a horticulture and horticulture-based convergence program tailored to the subject through plants. Horticultural therapists' tasks were derived from 32 tasks of the following six duties: horticultural therapy program preparation



**Fig. 1. Calculation of priority using the training prioritization tool. Establishment of task priorities (first to third) by systematically assessing their importance, difficulty, and frequency scores. Developing a curriculum (DACUM) committee members used a 5-point Likert scale, rounded the average score, and categorized it as low (1–2 points), medium (3 points), or high (4–5 points).**

(A); horticultural therapy program plan (B); horticultural therapy program execution (C); management (D); self-development (E); and convergence with other disciplines (i.e., interdisciplinary competency development) competency development (F).

Horticultural therapy program preparation entails the process of adequately preparing for the implementation of horticultural therapy. The tasks for the duty include the following: A1, finding an agency;

A2, responding to an agency or client; A3, promoting the program; A4, preliminary meeting with agency and client; A5, collecting subject information from the institution; A6, collecting information from the subject; A7, identifying human and material resources; and A8, conducting interviews with relevant personnel. The agency refers to an organization or institution such as a welfare center, hospital, or school that seeks to provide horticultural therapy.

The horticultural therapy program plan involves developing and preparing the program to help clients achieve their specific goals. The tasks for the duty include the following: B1, setting the treatment purpose; B2, designing a program for each session; B3, buying materials; B4, planning a detailed budget; and B5, pretraining.

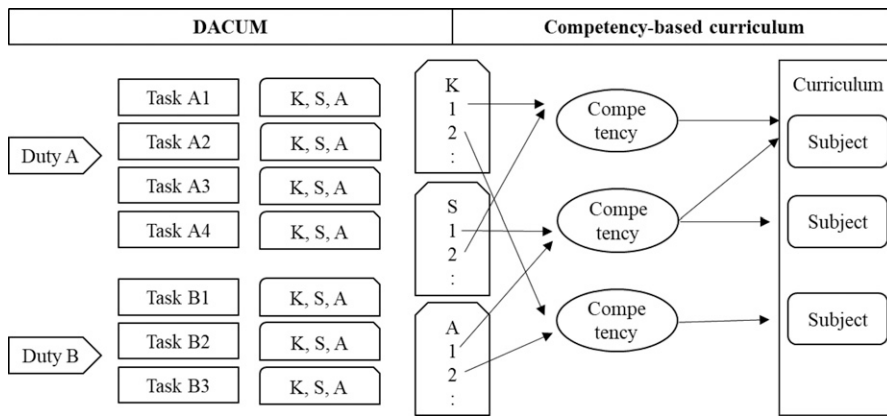
Horticultural therapy program execution refers to the actual duty of horticultural therapists providing therapy sessions to clients. The tasks for the duty include the following: C1, preparing in advance; C2, running the program; C3, cleaning the environment; C4, emergency response; C5, evaluating the program; C6, reporting results; and C7, performing personnel evaluations.

Management encompasses client and agency care considerations throughout the entire horticultural therapy process. The tasks for the duty include the following: D1, managing participants; D2, managing agencies; D3, promoting the results of the horticultural therapy program; and D4, processing administration.

Self-development refers to the duty that horticultural therapists undertake to improve their performance in their role. The tasks for the duty include the following: E1, participating in maintenance training; E2, cultivating document-writing skills; E3, receiving in-depth education; and E4, receiving personality education.

Convergence with other disciplines competency development means that horticultural therapists are responsible for developing multidisciplinary horticultural therapy services to enhance professionalism and effectiveness. Convergence is an innovation paradigm that advocates the integration of interdisciplinary knowledge through collaborative efforts to address a wide range of challenges (US National Research Council 2014; Li and Yu 2023). The tasks for the duty include the following: F1, fusing horticulture and science technology; F2, fusing horticulture and counseling psychology; F3, fusing horticulture and education; and F4, fusing horticulture, the humanities, and arts (creative fields).

As a result of the job analysis conducted during this study, it was found that horticultural therapists performed six duties and 32 sub-tasks. These findings deviate from those of previous



**Fig. 2.** Flowchart for developing a curriculum (DACUM) and competency-based curriculum of horticultural therapist. The step-by-step process of developing a competency-based curriculum. First, during the DACUM meeting, duties of horticultural therapists were identified (e.g., duty A or duty B), and tasks for each duty, along with the knowledge, skills, and abilities (KSAs) needed to perform these tasks, were determined (e.g., task A1 or B1). Finally, these KSAs were categorized, leading to the derivation of competencies, and suitable courses for developing these competencies were incorporated into the curriculum. K = knowledge; S = skill; A = attitude.

studies that examined eight duties and 45 sub-tasks (Kim et al. 2014). Kim et al. (2014) identified the following duties of horticultural therapists: selection of implementation institutions; diagnosis and evaluation of subjects; establishment of therapy plans; development of therapy; preparation for therapy implementation; horticultural therapy implementation; evaluation of therapy; and self-improvement of horticultural therapists. In the present study, certain tasks from previous studies were combined into broader categories to simplify the job analysis. For instance, the two duties of “selection of implementation institutions” and “diagnosis and evaluation of subjects” were integrated into the following single duty: horticultural therapy program preparation. The clarification and simplification of duties through job analysis provide a deeper understanding of jobs and roles, thus contributing to more effective curriculum designs (Schoeller 1957).

Additionally, this study introduced a new duty, convergence with other disciplines competency development, for horticultural therapists. These results reflect the current trend emphasizing the fourth industrial revolution and convergence technology (Yoo and Ryu 2015). In South Korea, efforts are being made to revitalize the rural convergence industry, also known as the sixth industry (Yoo and Ryu 2015). As part of these efforts, a national agro-healing

law (Act of Research, Development, and Promotion of Healing Agriculture, no. 17100) was enacted in 2020 (Ministry of Government Legislation 2020). This industrial trend aims to integrate the agricultural industry by combining the primary industry, agriculture, with the secondary industry, processing industry, and the tertiary service industries such as education, counseling, and arts. The profession of horticultural therapist originally combined horticultural and therapeutic elements, and this changing trend is giving rise to a new form of horticultural therapy service provision in South Korea. Previously, horticultural therapy was mainly conducted in institutions such as social welfare centers, kindergartens, or hospitals seeking horticultural therapy services. Now, a horticultural therapist might establish an agro-healing farm, where many horticultural therapists are now using horticultural crops and facilities within these agro-healing farms to provide horticultural therapy services that incorporate various technologies, including education, arts, humanities, and information technology (e.g., coding), for the healing of clients (Jang et al. 2020). There is a growing trend of horticultural therapy being practiced at the agro-healing farms that integrate these approaches. Therefore, there is an increased need for horticultural therapists to incorporate convergence technology into horticultural

therapy, thus keeping up with the prevailing trend.

**IDENTIFYING EDUCATION REQUIREMENTS THROUGH A SURVEY.** A comparison of task-specific assessments of current performance levels and future requirements levels showed significant differences between current and future performance levels of 26 of the 32 tasks ( $P < 0.05$ ). The average value of the future requirement levels was higher than that of the current performance levels (Table 1). These results indicate that horticultural therapists are aware of the need for self-improvement in their field and desire to develop themselves further.

Based on our analysis, we found that there was a statistically significant difference in evaluating the program (C5) at the current level and finding an agency (A1) at the future level ( $P < 0.05$ ) when comparing job performance based on qualification levels. However, there were no significant differences in the other tasks. It was observed that supervisors more often performed program evaluations than horticultural therapists with different qualification levels (Table 2). These results imply that horticultural therapists with higher qualification levels place a greater emphasis on evaluating both the therapeutic effects on participants and performance within the overall program. Additionally, horticultural therapists with qualification levels two and three had higher expectations for future work performance and the discovery of institutions than those with other qualification levels (Table 2). These results suggest that horticultural therapists with lower qualifications levels recognize the need to prioritize actively seeking out institutions or organizations interested in practicing horticultural therapy when performing their future roles.

These results indicate that the job performances of horticultural therapists with the same qualification levels are similar. This finding was in contrast with that of Kim et al. (2014), who reported differences in most items by qualifications. In contrast to the situation 15 years ago, when there was a noticeable difference in job performance based on the qualification level, current horticultural therapists perform similar duties regardless of their qualifications. These results are attributable to the positive effects of implementing various

**Table 1. Comparison of future requirement level results of horticultural therapy program preparation by qualification level. Future requirement level results show significant differences by qualification in finding an agency (A1) ( $P = 0.029$ ). Using the Duncan test to verify intragroup differences for postvalidation, we found that grades 2 and 3 differ from those of the supervisor.**

| Tasks   | Supervisor                     | Grade 1         | Grade 2           | Grade 3           | Significance        |
|---|--------------------------------|-----------------|-------------------|-------------------|---------------------|
|   | Mean $\pm$ SD                  |                 |                   |                   |                     |
| Finding an agency                                   | 3.92 $\pm$ 0.51 b <sup>i</sup> | 4.11 $\pm$ 0.73 | 4.38 $\pm$ 0.66 a | 4.38 $\pm$ 0.62 a | 0.029 <sup>ii</sup> |
| Responding to an agency or client                   | 4.58 $\pm$ 0.51                | 4.43 $\pm$ 0.79 | 4.52 $\pm$ 0.64   | 4.53 $\pm$ 0.55   | NS                  |
| Promoting the program                               | 4.00 $\pm$ 0.73                | 4.18 $\pm$ 0.77 | 4.38 $\pm$ 0.67   | 4.32 $\pm$ 0.61   | NS                  |
| Prior consultation                                  | 4.58 $\pm$ 0.51                | 4.46 $\pm$ 0.83 | 4.46 $\pm$ 0.67   | 4.41 $\pm$ 0.71   | NS                  |
| Collecting subject information from the institution | 4.58 $\pm$ 0.51                | 4.29 $\pm$ 0.81 | 4.45 $\pm$ 0.63   | 4.35 $\pm$ 0.70   | NS                  |
| Collecting information from the subject             | 4.33 $\pm$ 0.49                | 3.93 $\pm$ 0.99 | 4.16 $\pm$ 0.70   | 4.15 $\pm$ 0.73   | NS                  |
| Identifying human and material resources            | 4.58 $\pm$ 0.51                | 4.25 $\pm$ 0.75 | 4.38 $\pm$ 0.58   | 4.30 $\pm$ 0.64   | NS                  |
| Conducting interviews with relevant personnel       | 4.58 $\pm$ 0.51                | 4.32 $\pm$ 0.77 | 4.32 $\pm$ 0.67   | 4.23 $\pm$ 0.66   | NS                  |

<sup>i</sup> Means of future requirement level scores sharing a common letter are not significantly different according to Duncan's multiple range test at  $P < 0.05$ .

<sup>ii</sup> Nonsignificant (NS) or significant at  $P < 0.05$ , respectively.

systems and regulations of the association to increase the understanding of the duties and improve job performance capabilities of qualified horticultural therapists. Examples include the implementation of specialized training for horticultural therapists, unified educational materials and content, practice-oriented practices, and supplemental training programs (KHTA 2023; Park et al. 2012).

Based on the calculation of educational requirements using the Borich formula, a total of 32 tasks exhibited scores ranging from  $-0.76$  to  $4.98$ . The highest-rated task was "convergence horticulture and science technology" ( $4.98$ ), followed by "finding an agency" ( $4.77$ ), "promoting program results" ( $4.73$ ), "planning a detailed budget" ( $3.60$ ), and "convergence of horticulture and education" ( $3.15$ ) (Table 3). Most of the items with high educational demand were highly related to applied technology and therapeutic professions. These results showed different results of previous studies performed during the early 2000s, when the highest demand of the supervisor was to verify the job

activities of horticultural therapists because the standards for the role and treatment process of horticultural therapists were not clear at the time (Kim et al. 2014).

**A JOB MODEL FOR HORTICULTURAL THERAPISTS THROUGH CORE TASK CLASSIFICATION.** Regarding the core tasks, 30 of 32 tasks were selected based on their significance. Among these, 17 tasks were classified as highly important, 13 were classified as moderately important, and 2 were classified as relatively low in importance. The two low-priority tasks (namely C3 "clean the environment" and E4 "receive in-depth education") were excluded from the core tasks. The end version of the job model for horticultural therapists is shown in Fig. 3.

**COMPETENCIES FOR PERFORMING THE JOB OF A HORTICULTURAL THERAPIST.** The DACUM expert committee selected 25 essential competencies of horticultural therapists through a second workshop based on their theoretical and empirical knowledge. A total of 25 competencies for horticultural therapists were identified and

subsequently categorized into six subject categories (Table 4). Additionally, each competency was defined, and a comprehensive list of the KSA required for each competency was compiled (data not shown).

**DESIGN OF SPECIALIZED TRAINING FOR KOREAN HORTICULTURAL THERAPISTS.** To create a competency-based curriculum for horticultural therapists, 25 essential competencies were identified as educational fields and content. Then, the corresponding subjects were selected to develop these competencies. The competency-based horticultural therapy curriculum was developed by dividing it into a first-level qualification course, a second-level qualification course, and a third-level qualification course. Regarding the second- and third-level qualification courses, the existing courses were modified and supplemented, and the first-level qualification courses were newly established (Table 5). The completion area comprised seven areas according to the required competencies (Table 5). Two additional courses, convergence of horticultural therapy with

**Table 2. Comparison of current performance level results by qualification level when performing horticultural therapy program execution. Current performance level results show significant differences by qualification class for evaluating the program (C5) ( $P = 0.045$ ). Using the Duncan test for the post-test, we found that grades 1, 2, and 3 differ from those of the supervisor.**

| Tasks                    | Supervisor                      | Grade 1           | Grade 2           | Grade 3           | Significance    |
|--------------------------|---------------------------------|-------------------|-------------------|-------------------|-----------------|
|                          | Mean $\pm$ SD                   |                   |                   |                   |                 |
| Preparing advance        | 4.67 $\pm$ 0.49                 | 4.25 $\pm$ 1.00   | 4.42 $\pm$ 0.75   | 4.13 $\pm$ 0.88   | NS <sup>i</sup> |
| Running the program      | 4.08 $\pm$ 0.79                 | 4.43 $\pm$ 0.87   | 4.34 $\pm$ 0.74   | 4.20 $\pm$ 0.85   | NS              |
| Cleaning the environment | 4.75 $\pm$ 0.62                 | 4.39 $\pm$ 0.95   | 4.64 $\pm$ 0.68   | 4.68 $\pm$ 0.65   | NS              |
| Emergency response       | 4.17 $\pm$ 0.57                 | 4.04 $\pm$ 0.99   | 4.28 $\pm$ 0.81   | 4.20 $\pm$ 0.82   | NS              |
| Evaluating the program   | 4.75 $\pm$ 0.86 a <sup>ii</sup> | 3.93 $\pm$ 0.97 b | 4.08 $\pm$ 0.88 b | 4.08 $\pm$ 0.69 b | 0.045*          |
| Reporting results        | 4.08 $\pm$ 0.66                 | 4.00 $\pm$ 1.12   | 3.94 $\pm$ 1.00   | 3.73 $\pm$ 0.96   | NS              |
| Personnel evaluation     | 3.83 $\pm$ 1.11                 | 3.46 $\pm$ 1.03   | 3.42 $\pm$ 1.10   | 3.50 $\pm$ 0.87   | NS              |

<sup>i</sup> Nonsignificant (NS) or \*significant at  $P < 0.05$ , respectively.

<sup>ii</sup> Means of current performance level scores sharing a common letter are not significantly different according to Duncan's multiple range test at  $P < 0.05$ .

Table 3. Comparison of the current performance level and future required level results, education requirements, and priorities using Borich's needs analysis.

| Duty  | Content  | Task  | Current performance level |             | Future requirement level |                        | Difference |         | Education requirements <sup>i</sup> | Borich priority <sup>ii</sup> |
|---|--|---|---------------------------|-------------|--------------------------|------------------------|------------|---------|-------------------------------------|-------------------------------|
|   |  |   | Mean ± SD                 | Mean ± SD   | Mean ± SD                | Mean ± SD              | Mean ± SD  | t value |                                     |                               |
| Horticultural therapy program preparation                 | Finding an agency<br>Responding to an agency or client<br>Promoting the program<br>Prior consultation  | Collecting subject information from the institution<br>Collecting information from the subject  | 3.24 ± 1.09               | 4.34 ± 0.67 | 1.10 ± 1.13              | 16.834* <sup>iii</sup> | 4.77       | 2       |                                     |                               |
|   |  |   | 4.23 ± 0.88               | 4.52 ± 0.64 | 0.28 ± 0.82              | -5.988*                | 1.27       | 19      |                                     |                               |
|   |  |   | 3.81 ± 0.91               | 4.34 ± 0.67 | 0.53 ± 0.93              | -9.957*                | 2.30       | 13      |                                     |                               |
|   |  |   | 4.30 ± 0.87               | 4.46 ± 0.68 | 0.16 ± 0.83              | -3.400*                | 0.71       | 24      |                                     |                               |
| Horticultural therapy program plan                        | Identifying human and material resources<br>Conducting interviews with relevant personnel<br>Setting the treatment purpose<br>Designing a program for each session   | Buying materials<br>Planning detailed budget<br>Pretraining <sup>iv</sup><br>Preparing in advance<br>Running the program                | 3.96 ± 0.99               | 4.42 ± 0.65 | 0.46 ± 0.96              | -8.376*                | 2.03       | 16      |                                     |                               |
|   |  |   | 3.55 ± 1.09               | 4.14 ± 0.73 | 0.59 ± 1.07              | -9.552*                | 2.44       | 12      |                                     |                               |
|   |  |   | 4.11 ± 0.89               | 4.37 ± 0.60 | 0.26 ± 0.81              | -5.538*                | 1.14       | 21      |                                     |                               |
|   |  |   | 4.21 ± 0.92               | 4.32 ± 0.67 | 0.10 ± 0.86              | -2.141*                | 0.43       | 26      |                                     |                               |
| Horticultural therapy program execution                   | Setting the treatment purpose<br>Designing a program for each session<br>Buying materials<br>Planning detailed budget<br>Pretraining <sup>iv</sup><br>Preparing in advance<br>Running the program<br>Cleaning the environment      | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 4.15 ± 0.88               | 4.40 ± 0.60 | 0.25 ± 0.85              | -5.092*                | 1.10       | 22      |                                     |                               |
|   |  |   | 4.40 ± 0.82               | 4.43 ± 0.66 | 0.02 ± 0.85              | -0.541                 | 0.09       | 29      |                                     |                               |
|   |  |   | 4.32 ± 0.84               | 4.33 ± 0.70 | 0.00 ± 0.81              | -0.143                 | 0.00       | 30      |                                     |                               |
|   |  |   | 4.26 ± 0.87               | 4.34 ± 0.67 | 0.83 ± 0.84              | -1.710                 | 3.60       | 4       |                                     |                               |
| Management  | Promoting the results of the horticultural therapy program<br>Processing administration<br>Participate in maintenance training<br>Cultivate document-writing skills<br>Receive in-depth education<br>Receive personality education | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 3.70 ± 1.03               | 4.24 ± 0.67 | 0.53 ± 1.00              | -9.221*                | 2.25       | 14      |                                     |                               |
|   |  |   | 4.37 ± 0.79               | 4.40 ± 0.64 | 0.03 ± 0.77              | -0.672                 | 0.13       | 28      |                                     |                               |
|   |  |   | 4.32 ± 0.77               | 4.26 ± 0.67 | -0.06 ± 0.77             | 1.415                  | -0.26      | 31      |                                     |                               |
|   |  |   | 4.62 ± 0.71               | 4.45 ± 0.68 | -0.17 ± 0.63             | 4.839*                 | -0.76      | 32      |                                     |                               |
| Self-development  | Promoting the results of the horticultural therapy program<br>Processing administration<br>Participate in maintenance training<br>Cultivate document-writing skills<br>Receive in-depth education<br>Receive personality education | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 4.24 ± 0.82               | 4.52 ± 0.60 | 0.27 ± 0.76              | -6.247*                | 1.22       | 20      |                                     |                               |
|   |  |   | 4.09 ± 0.86               | 4.27 ± 0.68 | 0.17 ± 0.82              | -3.644*                | 0.73       | 23      |                                     |                               |
|   |  |   | 3.92 ± 1.00               | 4.05 ± 0.75 | 0.13 ± 0.95              | -2.427*                | 0.53       | 25      |                                     |                               |
|   |  |   | 3.45 ± 1.06               | 3.95 ± 0.78 | 0.49 ± 1.06              | -8.021*                | 1.94       | 18      |                                     |                               |
| Convergence with other disciplines competency development | Fusing horticulture and science technology<br>Fusing horticulture and counseling psychology<br>Fusing horticulture and education<br>Fusing horticulture, the humanities, and arts (creative fields)                                | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 3.01 ± 1.08               | 3.81 ± 0.81 | 0.79 ± 1.06              | -12.875*               | 3.01       | 7       |                                     |                               |
|   |  |   | 3.33 ± 1.01               | 3.95 ± 0.77 | 0.62 ± 1.07              | -10.042*               | 2.45       | 11      |                                     |                               |
|   |  |   | 2.73 ± 1.10               | 3.94 ± 0.76 | 1.20 ± 1.10              | -18.809*               | 4.73       | 3       |                                     |                               |
|   |  |   | 3.92 ± 1.11               | 3.99 ± 0.77 | 0.07 ± 1.03              | -1.235                 | 0.28       | 27      |                                     |                               |
| Convergence with other disciplines competency development | Fusing horticulture and science technology<br>Fusing horticulture and counseling psychology<br>Fusing horticulture and education<br>Fusing horticulture, the humanities, and arts (creative fields)                                | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 3.70 ± 1.00               | 4.18 ± 0.73 | 0.47 ± 1.08              | -7.596*                | 1.96       | 17      |                                     |                               |
|   |  |   | 3.54 ± 0.96               | 4.06 ± 0.73 | 0.52 ± 0.99              | -9.104*                | 2.11       | 15      |                                     |                               |
|   |  |   | 3.54 ± 1.03               | 4.14 ± 0.70 | 0.60 ± 1.06              | -9.813*                | 2.48       | 10      |                                     |                               |
|   |  |   | 3.51 ± 0.96               | 4.16 ± 0.70 | 0.64 ± 0.95              | -11.616*               | 2.66       | 9       |                                     |                               |
| Convergence with other disciplines competency development | Fusing horticulture and science technology<br>Fusing horticulture and counseling psychology<br>Fusing horticulture and education<br>Fusing horticulture, the humanities, and arts (creative fields)                                | Emergency response<br>Evaluating the program<br>Reporting results<br>Personnel evaluation<br>Managing participants<br>Managing agencies | 2.85 ± 1.09               | 4.08 ± 0.72 | 1.22 ± 1.07              | -19.682*               | 4.98       | 1       |                                     |                               |
|   |  |   | 3.48 ± 1.03               | 4.22 ± 0.72 | 0.73 ± 0.99              | -12.818*               | 3.08       | 6       |                                     |                               |
|   |  |   | 3.39 ± 1.01               | 4.15 ± 0.74 | 0.76 ± 0.96              | -13.771*               | 3.15       | 5       |                                     |                               |
|   |  |   | 3.47 ± 0.95               | 4.13 ± 0.73 | 0.65 ± 0.93              | -12.169*               | 2.68       | 8       |                                     |                               |

<sup>i</sup> A higher score corresponds to higher education requirements.

<sup>ii</sup> Lower numbers indicate higher rankings.

<sup>iii</sup> Significant at \*  $P < 0.05$ .

<sup>iv</sup> To successfully conduct horticultural therapy sessions as planned, it involves educating and training assistant facilitators on the essential therapeutic purposes and techniques for each session.

| Duties                                    | Tasks  |  |  |   |   |   |  |   |
|---|--|--|--|---|---|---|--|---|
| Horticultural therapy program preparation | Finding an agency (A)                          | Responding to an agency or client (A)                | Promote the program (B)                                      | Prior consultation (A)  | Collecting subject information from the institution (B) | Collecting information from the subject (A) | Human & material identifying resources (B) | Interview with the person concerned (A) |
| Horticultural therapy program plan        | Treatment purpose setting (A)                  | Designing a program for each session (A)             | Buying materials (A)   | Detailed budget planning (B)  | Pre-training (A)  |   |  |   |
| Horticultural therapy program execution   | Prepare in advance (A)                         | Running the program (A)                              | Clean up the environment (C)                                 | Emergency response (A)  | Evaluating the program (A)                              | Report results (B)                          | Personnel evaluation (B)                   |   |
| Management                                | Managing participants (B)                      | Managing agencies (B)                                | Promote the results of the horticultural therapy program (B) | Processing administration (B)   |   |   |  |   |
| Self-development                          | Participation in maintenance training (B)      | Cultivating document writing skills (B)              | Receive in-depth education (B)                               | Receive personality education (C)                                     |   |   |  |   |
| Convergence competency development        | Fusing horticulture and science technology (A) | Fusing of horticulture and counseling psychology (A) | Fusing of horticulture and education (A)                     | Fusing of horticulture, the humanities, and arts(creative fields) (A) |   |   |  |   |

**Fig. 3. Job model for horticultural therapists using the developing a curriculum (DACUM) method: (A) important, (B) moderate, and (C) not important.**

other disciplines and retraining, were added to the second- and third-level qualification courses, which comprised five existing courses. Specific educational topics were also reorganized. For example, regarding medical program completion, the subject was modified to include the acquisition of medical knowledge and skills that can be applied to horticultural therapy according to the needs of the client rather than focusing only on the medical field itself, such as psychology, rehabilitation medicine, and nursing (Table 5). The specialized training introduced two new areas, convergence of horticultural therapy with other disciplines and retraining, based on the derived competencies. The revised curriculum in this

study is aligned with the changing times and educational needs of horticultural therapists during the current times. The introduction of new areas will significantly expand the scope and responsibilities of horticultural therapists in the clinical field. For instance, through horticultural therapy and information technology convergence education, horticultural therapists will develop the expertise to effectively apply information and communication technology to horticultural activities. This proficiency will empower horticultural therapists to use information and communication technology-based smart pots for horticultural therapy interventions or design horticultural therapy programs using smart farms as a means of

vocational rehabilitation for individuals with disabilities. Additionally, virtual reality technology could be used to develop and implement horticultural therapy programs for the elderly and rehabilitation patients and vocational rehabilitation programs for those with limited physical accessibility (Lin et al. 2020).

Regularly reviewing and updating the job model and training curriculum will contribute to cultivating horticultural therapists with a sufficient sense of work and an understanding of the job. Additionally, horticultural therapists will be kept current with the latest professional developments and will help to improve their practice to maintain their therapeutic skills and knowledge so they can adequately and effectively address the needs of clients as professional therapists (Chyung et al. 2006).

However, because of the relatively low response rate of 16% to the survey among horticultural therapists during this study, generalizing the results to the entire population is challenging. Furthermore, it should be noted that the overall population of horticultural therapists has a notably high proportion of women, which could potentially introduce gender bias into the findings. Therefore, to develop more complete specialized training for horticultural therapists in South Korea, future research will be conducted to introduce a research protocol that can encourage horticultural therapists to respond to surveys. Additionally, to minimize

**Table 4. Classifications of 25 essential competencies for horticultural therapists in Korea.**

| Field   | Competency  |
|---|---|
| Horticultural   | Horticulture understanding competency   |
| Horticultural therapy                                       | Competency to use design and gardening decorations<br>Understanding the agency and preparing business proposals competency,<br>horticultural therapy program promotional competency, identify treatment spaces and facilities competency, horticultural treatment understanding competency,<br>horticultural treatment program operation competency, horticultural and material understanding competency, overall capacity for budgets competency, assessment operations and interpretation competency, ability to analyze the horticultural treatment process and prepare a course analysis paper competency, collective guidance competency, communication and negotiation competency, ability to build human networks competency |
| Counseling and welfare                                      | Counseling competency, understanding other and similar fields competency  |
| Medical   | Understanding horticultural treatment subject competency  |
| Convergence of horticultural therapy with other disciplines | Ability to collect and use information competency, convergence capabilities based on information technology <sup>i</sup> competency, humanities-based convergence capabilities competency, understanding curriculum competency  |
| Retraining  | Safety management competency, self-development competency, document creation competency, presentation competency  |

<sup>i</sup> Information technology refers to the use of computer systems, networks, and other technologies for storing, processing, transmitting, and retrieving information.



**Table 5. A competency-based specialized training regimen developed for horticultural therapists in Korea.**

| Field   | Required subjects (present) for the horticultural therapists training course (grades two and three) <sup>i</sup>  | Required subjects for the horticultural therapists training course (grades two and three) <sup>ii</sup>   | Required subjects for the graduate school (grade one) <sup>iii</sup>  | Elective courses   |
|---|---|---|---|--|
| Horticultural   | <ul style="list-style-type: none"> <li>• Cultivation and management of horticultural plants</li> <li>• Horticultural plant decoration and application technology</li> <li>• Indoor gardening and treatment garden</li> <li>• Urban agriculture</li> </ul> | <ul style="list-style-type: none"> <li>• Cultivation and management of horticultural plants</li> <li>• Indoor gardening and treatment garden</li> <li>• Urban agriculture</li> </ul>  | <ul style="list-style-type: none"> <li>• Social horticulture (people-plant relations)</li> <li>• Plant physiology</li> </ul>  | Horticulture, Phytology, Fruit cultivation, Vegetable cultivation, Flower cultivation, Herb phytology, Native botany, Landscape architecture, General plant pathology, Plant cultivation and reproduction  |
| Horticultural therapy                                       | <ul style="list-style-type: none"> <li>• Horticultural treatment introduction</li> <li>• Preparation and evaluation of horticultural treatment programs</li> <li>• Horticultural clinical practice</li> </ul>   | <ul style="list-style-type: none"> <li>• Horticultural treatment introduction</li> <li>• Preparation and evaluation of horticultural treatment programs</li> <li>• Horticultural clinical practice</li> <li>• Horticultural therapy planning and operation</li> </ul> | <ul style="list-style-type: none"> <li>• Horticultural therapy introduction</li> <li>• Development of horticultural therapy program and application</li> <li>• Horticultural treatment evaluation management</li> <li>• Horticultural therapy operating methodology</li> <li>• Therapeutic environmental study</li> </ul> | Seminar on preparation of proposals, Theory of start-up of horticultural therapy, Theory of operation of horticultural therapy, Space design theory for horticultural therapy, Therapeutic garden, Horticultural therapy operation methodology, Horticultural therapy tools and facilities |
| Field   | Required subjects (present) for the horticultural therapists training course (grades two and three) <sup>i</sup>  | Required subjects for the horticultural therapists training course (grades two and three) <sup>ii</sup>   | Required subjects for graduate school (grade one) <sup>iii</sup>  | Elective course  |
| Medical   | <ul style="list-style-type: none"> <li>• Horticultural therapy and psychiatry</li> <li>• Horticultural and rehabilitation medicine</li> <li>• Horticultural therapy and nursing</li> </ul>  | <ul style="list-style-type: none"> <li>• Horticultural therapy by subject (rehabilitation, spirit, nursing, elderly, children)</li> </ul>   | <ul style="list-style-type: none"> <li>• Horticultural therapy by subject (rehabilitation, spirit, nursing, elderly, children)</li> </ul>   | Horticultural therapy, Psychology  |
| Counseling and welfare                                      | <ul style="list-style-type: none"> <li>• Horticultural therapy and counseling psychology</li> <li>• Horticultural therapy and social welfare</li> </ul>   | <ul style="list-style-type: none"> <li>• Horticultural therapy and counseling psychology</li> <li>• Horticultural therapy and social welfare</li> </ul>   | <ul style="list-style-type: none"> <li>• Horticultural therapy counseling theory and practice</li> </ul>  | Complementary alternative medicine, Volunteerism   |
| Convergence of horticultural therapy with other disciplines |   | <ul style="list-style-type: none"> <li>• Plant science</li> <li>• Plant science and social Problems</li> </ul>  | <ul style="list-style-type: none"> <li>• Developing information technology<sup>iv</sup> convergence programs and case studies</li> </ul>  | Collection and management of horticultural therapy information, Growth and aging, and the development of   |

*(Continued on next page)*

Table 5. (Continued)

| Field      | Required subjects (present) for the horticultural therapists training course (grades two and three) <sup>i</sup> | Required subjects for the horticultural therapists training course (grades two and three) <sup>ii</sup>   | Required subjects for the graduate school (grade one) <sup>iii</sup>  | Elective courses   |
|------------|--|---|---|--|
| Retraining |  | <ul style="list-style-type: none"> <li>• Safety management, first aid tips, and horticultural therapy supervision</li> <li>• Development of horticultural therapy capabilities</li> </ul> | <ul style="list-style-type: none"> <li>• Development of humanities convergence program and case study</li> <li>• Curriculum-based program development and case study (special education)</li> </ul> | human life expectancy, Health psychology<br><br>Human management, Document preparation method, Presentation techniques |

<sup>i</sup> This pertains to the current horticultural therapist training course offered by the Korea Horticultural Therapy Welfare Association.

<sup>ii</sup> This content relates to the development of competency-based specialized training for horticultural therapists at levels two and three as a result of this study.

<sup>iii</sup> This content relates to the development of competency-based specialized training for horticultural therapists at levels one as a result of this study.

<sup>iv</sup> Information technology, which refers to the use of computer systems, networks, and other technologies for storing, processing, transmitting, and retrieving information.

the risk of gender bias, we will consider introducing a sampling method to increase responses from male horticultural therapists.

## References cited

Behr BK, Huddleston PT, Hall CR. 2022. Gardening motivations of US plant purchasers during the COVID-19 pandemic. *J Environ Hortic.* 40:10–17. <https://doi.org/10.24266/0738-2898-40.1.10>.

Borich CD. 1980. A needs assessment model for conducting follow-up studies. *J Teach Educ.* 31:39–42. <https://doi.org/10.1177/00224871800310031>.

Cascio WF. 1998. *Applied psychology in human resource management* (5th ed). Prentice Hall, Upper Saddle River, NJ, USA.

Chyung SY, Stepich D, Cox D. 2006. Building a competency-based curriculum architecture to educate 21st-century business practitioners. *J Educ Bus.* 81:307–314. <https://doi.org/10.3200/JOEB.81.6.307-314>.

Hesse GC. 1989. Methodological issues of research to DACUM and curriculum conference (are there really differences between the DACUM method and the curriculum conference). <http://eric.ed.gov/?id=ED313522>. [accessed 4 Mar 2022].

Huang MH, Rust RT. 2018. Artificial intelligence in service. *J Serv Res.* 21: 155–172. <https://doi.org/10.1177/109467051775245>.

Jang HS, Jeong SJ, Kim JS, Yoo E. 2020. Relationship between participants satisfaction

in agro-healing activities in a healing farm and the level of stress and loyalty. *J People Plant Environ.* 23:411–422. <https://doi.org/10.11628/ksppe.2020.23.4.411>.

Kim SY, Park SA, Son KC, Lee C. 2014. Horticultural therapy: Job analysis, performance evaluation, and educational needs. *Weonye Gwahag Gisulji.* 32:887–900. <https://doi.org/10.7235/hort.2014.14110>.

Korea Horticultural Therapy Welfare Association (KHTA). 2023. Association introduction. [www.khta.or.kr](http://www.khta.or.kr). [accessed 4 Jun 2023].

Li J, Yu Q. 2023. The evolutionary characteristics and interaction of interdisciplinarity and scientific collaboration under the convergence paradigm: Analysis in the field of materials genome engineering. *Sustainability.* 15:13417. <https://doi.org/10.3390/su151813417>.

Lin TY, Huang CM, Hsu HP, Liao JY, Cheng VY, Wang SW, Guo JL. 2020. Effects of a combination of three-dimensional virtual reality and hands-on horticultural therapy on institutionalized older adults' physical and mental health: Quasi-experimental design. *J Med Internet Res.* 22:e19002. <https://doi.org/10.2196/19002>.

Ministry of Government Legislation. 2020. <https://www.law.go.kr/LSW/eng/engLsSc.do?menuId=2&section=lawNm&query=care+farming&x=0&y=0#libgcolor0>. [accessed 11 Feb 2023].

National Center for Complementary and Alternative Medicine (NCCAM). 2021. [nccam.nih.gov/health/whatiscam/](http://nccam.nih.gov/health/whatiscam/). [accessed 13 Sep 2023].

Naquin S, Holton ED. 2003. Motivation to improve work through learning in human resource development. *Hum Resour Dev Int.* 6:355–370. <https://doi.org/10.1080/13678860210154431>.

Norton R, Moser J. 2008. *DACUM handbook* (3rd ed). Ohio State Univ., Columbus, OH, USA.

Oh IK, Choi JY. 2005. *Methods for developing instruction programs*. Hakjisa, Seoul, Korea.

Park JS, Suh CG, Han SK. 2005. Improvement of direction of job analysis for the development of vocational education and training program. Krivet, Seoul, Korea.

Park SA, Lee AY, Lee G, Kim DS, Kim WS, Shoemaker CA, Son KC. 2016. Horticultural activity interventions and outcomes: A review. *Weonye Gwahag Gisulji.* 34:513–527. <https://doi.org/10.12972/kjhst.20160053>.

Park SA, Son CK, Cho WG. 2012. Practice of horticultural therapy in South Korea. *Acta Hortic.* 954:179–185. <https://doi.org/10.17660/ActaHortic.2012.954.24>.

Schoeller VD. 1957. Work simplification applied to nursing. *Am J Nurs.* 57:1034–1035.

Shoemaker CA, Diehl ERM. 2012. The practice and profession of horticultural therapy in the United States. *Acta Hortic.* 954:161–163. <https://doi.org/10.17660/ActaHortic.2012.954.20>.

Son KC, Jung SJ, Lee AY, Park SA. 2016. The theoretical model and

universal definition of horticultural therapy. *Acta Hort.* IHC2014:79–88. <https://doi.org/10.17660/ActaHortic.2016.1121.12>.

Starling LA, Waliczek TM, Haller R, Brown BJ, Malone R, Mitrione S. 2014. Job task analysis survey for the horticultural therapy profession. *HortTechnology*. 24:645–654. <https://doi.org/10.21273/HORTTECH.24.6.645>.

Stowell DR, Fly JM, Klingeman WE, Beyl CA, Wozencroft AJ, Airhart DL, Snodgrass PJ. 2021. Current state of the horticultural therapy profession in the United States. *HortTechnology*. 31: 330–338. <https://doi.org/10.21273/HORTTECH04792-21>.

Scupin R. 1997. The KJ method: A technique for analyzing data derived from Japa-

nese ethnology. *Hum Organ*. 56:233–237. <https://doi.org/10.17730/humo.56.2.x335923511444655>.

Tütlys V, Spoettl G. 2017. From the analysis of work-processes to designing competence-based occupational standards and vocational curricula. *Eur J Training Dev*. 41:50–66. <https://doi.org/10.1108/EJTD-10-2015-0078>.

The National Center for Education Statistics of the US Department of Education. 2001. Defining and assessing learning: exploring competency-based initiatives. Department of Education, National Center for Education Statistics, Washington, DC, USA.

US National Research Council. 2014. *Convergence: facilitating Transdisciplinary Integration of Life Sciences*, Physical Sci-

ences, Engineering, and Beyond. National Academies Press, Washington, DC, USA.

Yoo NY. 2016. Analysis on the actual job performance for occupational specialization of horticultural therapist (Master Thesis). Konkuk University, Seoul, Korea.

Yoo SO, Rhu SY. 2015. Enhancing the value of agriculture rural communities by activating the sixth industry: Focused on PR communication strategies. *Int J Tourism Hospitality Res*. 29(12): 77–90.

Zhang W, Li J. 2023. A quasi-experimental analysis on the causal effects of COVID-19 on urban park visits: The role of park features and the surrounding built environment. *Urban For Urban Green*. 82:127898. <https://doi.org/10.1016/j.ufug.2023.127898>.