

Establishing a gerontechnology graduate program in Korea: Educational rationale, goals, and curriculum design

Woojung Shim PhD^a

^aDepartment of Gerontechnology, Graduate School, Chongshin University, Seoul, Republic of Korea

*Corresponding author: fskorea@hanmail.net

Abstract

Background: Global population aging demands structural transformation across social, economic, and healthcare systems, positioning the convergence of science and technology as an essential strategic response. Gerontechnology has evolved beyond improving the quality of life for older adults or developing assistive technologies; it has emerged as a key interdisciplinary field that contributes not only to the enhancement of individual living and wellbeing but also to the integrated construction of sustainable welfare, industrial, and social systems that drive innovation in aging societies. However, despite the growing importance of Gerontechnology, there is currently no graduate-level program in Korea specifically designed to cultivate professionals capable of integrating science and technology into later-life development and the advancement of an aging society.

Methods: This study analyzed the philosophy, objectives, and core characteristics of Gerontechnology and examined existing domestic and international educational and graduate programs in related fields. Based on an analysis of current and future societal, student, and industry needs, the study identified the essential roles and competencies required of gerontechnologists. Subsequently, using Tyler's goal-oriented model and the ADDIE instructional design framework, key professional competencies were derived, and a constructivist curriculum was developed to address them. The validity of the proposed curriculum was verified through a Content Validity Index (CVI) evaluation by 21 experts, including professors, students, and industry practitioners (n=7 in each group).

Results: Five core professional competencies and twelve curriculum subjects were identified. The competencies comprised: (1) foundational gerontological literacy, (2) foundational gerontechnological literacy, (3) integrative Gerontechnology research competency, (4) Gerontechnology leadership competency, and (5) Gerontechnology business competency. The CVI result (0.905) confirmed a high level of content validity.

Conclusions: This study presents an initial framework for a graduate curriculum in Gerontechnology tailored to the Korean context. The program aims to cultivate interdisciplinary professionals who can realize the academic mission and social value of Gerontechnology by integrating science, technology, and human life in later adulthood. Future work will include pilot implementation and institutional feedback to verify educational effectiveness and societal relevance.

Keywords: Gerontechnology; Graduate Program; Curriculum Design; Professional Competency; Higher Education

INTRODUCTION

Gerontechnology has gained international recognition as an interdisciplinary field that addresses the diverse personal and social challenges of aging and enhances the quality of life in later years. Particularly after the COVID-19 pandemic, the adoption and integration of science and technology into senior life have become indispensable.

The International Society for Gerontechnology (ISG) defines Gerontechnology as “designing technology and environment for independent living and social participation of older persons in good health, comfort and safety” (International Society for Gerontechnology, 2025, para.

1). Moreover, ISG emphasizes that the mission of Gerontechnology is to promote and facilitate technological innovation based on scientific knowledge of aging processes and an understanding of cultural and individual differences, thereby fostering the development of products and services that meet the needs and aspirations of older adults (International Society for Gerontechnology, 2025, para. 2).

The goals of Gerontechnology are closely associated with five domains of human activity—prevention, compensation, care, enhancement of quality of life, and self-actualization—spanning the areas of health and self-esteem, housing and daily functioning, communication, mo-

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bility and transportation, and work and leisure (Bouma et al., 2007).

Kort (2009), in the ISG Masterclass, emphasized that Gerontechnology should move beyond the traditional ADL and IADL frameworks of functional support to include pleasure and joy as integral dimensions of human life.

Today's scientific and technological advances—artificial intelligence (AI), robotics, and the metaverse—offer unprecedented opportunities to integrate technology with later-life experiences. In this rapidly evolving context, Gerontechnology has evolved beyond a mere academic discipline; it represents a philosophy of innovation and a framework for social practice that can reshape the experience of aging itself.

In synthesis, the definition and mission of Gerontechnology can be understood as the integration of science and technology into human life to realize the values of health, autonomy, participation, safety, and dignity in an aging society. It provides both an academic and practical framework for improving life in later years and fostering innovation at the individual and societal levels.

From a societal perspective, Korea has already entered a super-aged stage, with over 24 million people aged 40 and older—approximately 60% of the total population (as of September 2025, Korean Resident Registration Statistics). These individuals—defined as aging-stage persons—experience significant physical, psychological, and social changes. Consequently, there is a growing need to build science- and technology-integrated environments that promote prevention, compensation, care, and quality of life, as well as to provide social support for personal life planning based on such technologies.

To realize these philosophical and social objectives, there is an urgent need for an educational and research infrastructure that systematically studies the theoretical foundations of Gerontechnology and applies them to real-life and industrial contexts through the convergence of life and technology.

In Korea's higher education system, no formal graduate program currently offers Gerontechnology as a major. At the undergraduate level, departments such as Silver Industry Studies or Senior Business Studies exist, and at the graduate level, some programs—such as Aging-Friendly Industry Studies—are in operation. However, these programs rarely provide courses that adopt a science- and technology-based interdisciplinary approach.

The present author has developed and implemented three Gerontechnology-related courses at Inha University's Graduate School of Public Policy (Department of Gerontology) and at the Digital Culture and Arts University (Department of Social Welfare). Additionally, Sungkonghoe University has newly introduced a course titled Introduction to Gerontechnology. Such initiatives indicate a growing academic interest and demand for Gerontechnology education in Korea, suggesting that related programs are likely to expand further in the near future.

Meanwhile, in the industrial sector, service providers increasingly seek professionals who can understand the complex needs of older adults and plan, develop, and supply suitable products and services. On the demand side, older adults and their families are calling for Gerontechnology-based solutions that genuinely improve their living and society. However, there is currently no specialized educational program in Korea dedicated to designing, implementing, and evaluating technologies and environments that older adults can readily use.

From social, educational, and industrial perspectives—and considering both the aging individuals and the professionals who consult, plan, and implement Gerontechnology solutions—there is a clear necessity to cultivate experts in this emerging field. Because the development of such expertise requires multidisciplinary collaboration and advanced research capacity, it cannot be achieved solely at the undergraduate level. Hence, professionals must acquire not only knowledge of aging but also a deep understanding of Gerontechnology and its integrative research methodologies.

Accordingly, the establishment of a Graduate Program in Gerontechnology represents a timely and necessary initiative to address the challenges posed by rapid population aging, respond to social and industrial transformation, and foster integrative professionals who can lead innovation in an aging society.

This study thus presents a curriculum design for a proposed Master's and Doctoral Program in Gerontechnology at Chongshin University. The research aims to identify educational objectives and core competencies required for developing Gerontechnology professionals—from life-planning and consulting experts to product, service, and policy designers—and to construct a graduate-level curriculum grounded in these competencies.

METHODS

Gerontechnology remains an emerging academic discipline, with its research base, indus-

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trial demand, and institutional structures still developing. In particular, the domains of life improvement through advanced technology and social innovation for aging societies lack well-established occupational models or industrial frameworks. Hence, a purely industry-oriented curriculum design method such as DACUM (Developing A Curriculum; Norton, 1997), which focuses on task analysis and occupational roles, is inherently limited in its applicability to this field.

Accordingly, this study adopted a philosophy-driven educational design approach grounded in the fundamental principles and ultimate goals of Gerontechnology—rather than an industrial demand-driven training framework. This approach integrates consideration of both aging individuals and providers—including researchers, designers, industries, and governmental bodies, connecting and advancing both sides. The central design principle was to align the curriculum with the core mission of Gerontechnology: to promote innovation to advance human living and aging societies. This approach presumes that the graduate school should not merely replicate existing industrial structures but instead function as a pioneering academic platform that creates new professional domains and defines their standards.

Tyler's (1949) Goal-Oriented Model was adopted as the structural framework to ensure logical coherence among educational objectives, learning experiences, and evaluation criteria. Meanwhile, Constructivist Learning Theory was incorporated to promote learner-centered knowledge construction, whereby learners actively build understanding through exploration, participation, and reflection within authentic contexts. Accordingly, the curriculum was designed to immerse students in the lived realities of aging and technology—encouraging inquiry, collaboration, and reflective thinking to reconstruct knowledge through experience. This approach aligns with the integrative and practice-based learning characteristics that Gerontechnology education aspires to achieve (Çakır, 2008).

The curriculum development process comprised four major stages:

- **Situational Analysis:** Comparative analysis of similar programs, prior studies, stakeholder needs (educational institutions, industry, and learners), and existing curricula in related departments was conducted to identify the current status and differentiation points of Gerontechnology education in Korea and abroad.
- **Derivation of Competency Framework:** Core professional competencies were identified by

reflecting the philosophy, mission, and objectives of Gerontechnology.

- **Course Structuring and Content Design:** Courses and learning contents were organized to fulfill the competencies derived from the previous stage.
- **Expert Validation:** The curriculum's content validity was examined using the Content Validity Index (CVI) based on Fehring's (1987) method. Detailed criteria for expert selection and the specific CVI calculation procedure are provided in Section 6.

Through this integrated approach, which combines Tyler's structural model with constructivist learning principles, the proposed curriculum achieves both structural coherence and learner-centered flexibility. This design not only reflects the interdisciplinary and practice-oriented nature of Gerontechnology education but also provides a sustainable academic foundation for future research and innovation in the field.

Competency framework and curriculum derivation

1) Current Status Analysis

Various international initiatives have been undertaken to expand professional education and research opportunities in the field of Gerontechnology at both undergraduate and graduate levels.

First, the International Society for Gerontechnology (ISG) hosts the ISG Masterclass biennially, offering master's and doctoral students opportunities to learn directly from leading scholars in the field about methodologies for integrating technology and aging research.

Second, the World Academy for Gerontechnology (WAGT) serves as an international educational platform dedicated to nurturing global Gerontechnology talent. It fosters scholarly exchange by enabling researchers worldwide to share emerging research trends and practical case studies.

Third, Canada's AGE-WELL Network operates the EPIC (Early Professionals, Inspired Careers) program, which includes the Gerontechnology Design School and the Health and Engineering Summer School. These initiatives exemplify integrative education that bridges engineering and healthcare, focusing on innovation for aging societies.

Fourth, the GENIE Program in Europe offers Gerontechnology-related curricula at both the bachelor's (BSc) and master's (MSc) levels. The program integrates technology, design, and social welfare studies to develop comprehensive educational models that support interdisciplinary learning.

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Fifth, several formal graduate programs worldwide provide structured training in this field:

- The Master of Science in Applied Technology and Aging (MSATA) at the University of Southern California consists of 32 units (24 required, 8 elective) and focuses on technological innovation and real-world applications addressing practical challenges such as aging environments, chronic diseases, and cognitive decline.
- The Master of Science in Smart Ageing and Gerontology (SAG), jointly operated by Lingnan University and the Hong Kong Metropolitan University (HKMU), develops expertise across smart ageing, gerontology, and Gerontechnology. The program comprises nine courses (30 credits total) and includes a capstone project that strengthens students' capacity for real-world problem solving.
- The M.Sc. in Inclusive Design, Digital Health, and Case Management at Frankfurt University of Applied Sciences emphasizes practical, interdisciplinary education. It consists of six specialized modules, three team-based projects, and one master's thesis, with the goal of cultivating professionals skilled in inclusive design and digital health implementation.

While global higher education systems have made significant progress in establishing diverse Gerontechnology curricula, Korea currently lacks a formal graduate-level program dedicated to this discipline. Although no university offers a department explicitly named "Gerontechnology," some institutions have independently attempted to explore the intersection of aging and technology. However, a systematic and comprehensive curriculum remains absent, and students must often assemble their learning paths through disparate courses across various disciplines.

Hence, there is an urgent need to develop, implement, and evaluate a standardized foundational curriculum that defines Gerontechnology as a coherent academic field and supports the systematic cultivation of professionals.

Based on international best practices and comparative analyses, the following core competencies are identified as essential for a graduate-level program in Gerontechnology:

- The ability to integrate and apply interdisciplinary knowledge across technology, health, and social sciences;
- The ability to recognize and mediate cultural and ethical issues in the application of technology for aging populations;
- The ability to employ empirical research and design thinking to develop human-centered solutions;
- The ability to translate Gerontechnology concepts into practical products, services,

and policies; and

- Leadership capacity to facilitate coordination and collaboration among government, academia, and industry sectors.

2) Needs Analysis

The educational needs in the field of Gerontechnology were identified through practical experiences in domestic educational programs and multiple years of field-based assessments. Although the investigations were not large-scale statistical surveys, they served as meaningful empirical references for deriving the developmental direction of Gerontechnology education in Korea.

(1) Student Perspective.

A 2024 survey of 89 undergraduate students majoring in aging-related studies revealed a strong interest in interdisciplinary curricula that would enable them to contribute to aging societies. Many students expressed a desire to develop technology-convergence competencies for innovation in later life and preferred practice-oriented programs that ensure both qualification connectivity and career continuity.

(2) Industry Perspective.

In a 2022 needs assessment conducted during the planning of the Aged-Friendly Digital Transformation (DX) Training Program organized by the Ministry of Health and Welfare, responses from 97 corporate professionals indicated that key competencies required for core personnel were business planning (29%), marketing (22%), research and development (17%), and service delivery (13%).

This pattern reflects the increasing demand for professionals capable of understanding the characteristics of aging populations and integrating advanced technologies to design, develop, evaluate, and supply age-friendly products and services—particularly as digital transformation accelerates across healthcare, housing, and leisure industries.

Among 53 program participants, 87.5% of those employed in companies ($n = 25$) expressed a desire to strengthen their digital-transformation competencies. Among job seekers ($n = 28$), 67.4% were interested in careers in business strategy and planning, 28.3% in research and development, and 54.3% in marketing (multiple responses allowed). Furthermore, in-depth interviews with five corporate executives in 2024 revealed a consensus that gerontological expertise and life-service planning skills will become the core competitive strengths of future aging-industry sectors.

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(3) Societal Perspective.

Key societal challenges have emerged—such as the growing burden of care, late-life economic insecurity, and the need for preventive approaches to aging. In modern societies, science and technology education is shifting from simple skill acquisition toward responding to social needs. Gerontechnology plays a critical role as a connecting discipline that bridges the demands of older adults and pre-elderly populations with technological developments and social systems (Bouma et al., 2009; van Bronswijk et al., 2009). Hence, an academic approach that systematically studies the interrelations between older adults' needs, the conditions for improving their lives, and technological applications (Bouma et al., 2007) is essential.

Taken together, these findings underscore the necessity of an educational model that simultaneously supports (a) students' career development and professional competency enhancement, (b) the industry's demand for interdisciplinary talent, and (c) societal innovation for improving older adults' lives and transforming aging societies.

To engage professionally in Gerontechnology-related fields, students must acquire not only advanced domain knowledge from their undergraduate disciplines but also an integrated understanding of aging-related physical, psychological, and social changes together with technological characteristics and applications. However, the current undergraduate system in Korea makes it difficult to provide such convergence competencies. For instance, while students in medicine, engineering, psychology, or social welfare might wish to take additional Gerontechnology-related courses, the heavy credit load of required major courses often limits their ability to do so systematically.

Hence, a graduate-level integrative education model—one that preserves disciplinary depth while expanding it through interdisciplinary convergence—is required. A Gerontechnology graduate program (master's and doctoral levels) can meet this need by enabling both academic inquiry and professional practice.

Such a program would:

- Provide students with new career competitiveness;
- Supply industries with professionals capable of Gerontechnology planning, research and development, and marketing; and
- Offer society a robust academic foundation for cultivating highly skilled professionals who will lead innovation in aging societies.

3) Development of the Competency Framework

To realize a virtuous cycle of education, research, and practice, it is essential to establish a systematic educational foundation that can not only address individual changes in later life but also lead innovation in aging societies. Accordingly, this program is designed as a specialized Gerontechnology curriculum for professionals with undergraduate or higher-level expertise, equipping them with the competencies required for the integration of aging and technology.

(1) Foundational Competency in Gerontechnology
Bouma et al. (2007) proposed that the knowledge base of Gerontechnology is formed through the integration of two domains: insight into the processes of individual and societal aging, and understanding of emerging technological possibilities. Likewise, Graafmans et al. (1994) defined Gerontechnology as “the research and development of various techniques and products based on scientific knowledge of the aging process.”

In other words, the convergence of aging and technology constitutes the academic foundation of Gerontechnology. The foundational competency therefore refers to the ability of professionals—regardless of their original discipline—to understand both aging individuals and Gerontechnology in an integrated manner. This encompasses not only conceptual knowledge of aging but also the ability to comprehensively understand and respond to the physical, psychological, and social changes that accompany aging.

(2) Integrative Research Competency in Gerontechnology

Bouma, Fozard, and van Bronswijk collectively emphasized that Gerontechnology should not be confined to the design of assistive devices but understood as a dynamic interdisciplinary field grounded in the interaction between human aging and technological innovation. Hence, it is essential for gerontechnologists to move beyond perceiving technology as a simple tool and instead recognize it as an integrative concept that both interacts with and transforms human life (Bouma, 2012; Fozard, 2002; Bouma et al., 2009).

Digital transformation (DX) is the process by which digital technologies are integrated into business operations and organizational processes to create value (Vial, 2019). In contrast, Artificial Intelligence Transformation (AIX) signifies a stage in which organizations and industries integrate and utilize artificial intelligence as a core infrastructure (Ministry of Science and ICT, 2023). These transformations extend beyond technologi-

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cal innovation—they are fundamentally reshaping older adults' living and the aging society.

Accordingly, gerontechnologists must develop the capacity to integrate digital and AI technologies within the lived context of older adults, thereby exploring, designing, and validating Gerontech Life Transformation. This integrative research competency involves the ability to forecast the direction of future technological development, understand its characteristics, and design and evaluate models that harmonize technological applications with the physical, psychological, and social changes associated with aging.

(3) Leadership competency in Gerontechnology To date, technological progress has rarely considered the needs of older adults. As Bouma et al. (2007, p. 191) noted, many older individuals “neither have the desire nor the ability to use new technological conveniences.” They further emphasized that the rapid expansion of the aging population and technological innovation have evolved as separate trajectories, lacking mutual coordination. This highlights the necessity of strategic coordination between the demands of older adults and the technological supply system.

In response, this program introduces the leadership competency in Gerontechnology, designed to enable learners to integrate and mobilize diverse resources to advance innovation in aging societies and improve living in later years. This competency includes the ability to lead practical domains such as Gerontechnology planning, policy development, marketing, and management, ultimately preparing students to become integrative leaders who drive social and technological innovation in aging societies.

The overarching goal of the Gerontechnology Graduate Program is as follows:

“To integrate life and technology in order to identify and address problems and emerging needs associated with aging, create environments that generate positive outcomes, and ultimately enable individuals to design and realize new ways of living.”

To achieve this goal, the program cultivates the following three core competencies:

- Foundational Competency: Understanding aging and its multidimensional changes.
- Integrative Research Competency: Forecasting scientific and technological developments and creating and evaluating life models.

- Leadership Competency: Leading planning, R&D, evaluation, and policy execution across individual, public, and industrial domains.

4) Curriculum Design

Based on the three core competencies of Gerontechnology—foundational, integrative research, and leadership—specific courses were organized using a curriculum framework that integrates Tyler's (1949) objective-centered model and constructivist learning theory.

(1) Courses for foundational competency

This area is divided into two domains: understanding aging and understanding Gerontechnology.

First, understanding aging covers the fundamental concepts of gerontology and explores the multidimensional physical, psychological, and social changes that occur throughout individual life courses.

Second, understanding Gerontechnology involves analyzing its definitions, goals, scope, and representative cases while enabling students to identify the convergent characteristics between gerontology and technology through instructional design.

In Korea, a formal “Department of Gerontology” does not yet exist, and most academic disciplines address aging only partially. Hence, for this graduate program—designed to integrate professionals from diverse disciplines—it is essential to include this subject as a core required course.

According to the World Health Organization's International Classification of Functioning, Disability and Health (ICF) (WHO, 2001), human body functions, activities, and participation form an interrelated system that changes alongside social and environmental factors. Expanding this model allows us to conceptualize a hierarchical process of change:

Structural changes of body and mind → functional changes (motor, cognitive) → lifestyle changes → life-course changes → societal changes in aging.

Grounded in this framework, the course avoids passive lecture-based instruction and instead applies the constructivist learning principle of learner-centered knowledge construction (Çakır, M., 2008). Learners actively construct knowledge through inquiry, participation, and reflection within real contexts that connect aging, movement, lifestyle, life, and society.

Accordingly, the course “Study on Life and Living Across Aging Stages” focuses on integrating

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theoretical understanding with empirical analysis of physical, psychological, and social aging to explore and address complex life changes.

(2) Courses for Integrative Research Competency Scientific and technological progress continues to advance, while aging itself is an ongoing process. When life and technology are synergistically integrated, such transformations not only enhance adaptation but accelerate the evolution toward an improved way of living, thereby generating new demands.

Hence, Gerontechnology professionals must be able to anticipate future technological changes and create and evaluate innovative life models that integrate advanced technologies with evolving lifestyles.

Learners are guided to identify and define personal and societal needs within their own professional fields. Through aging-life simulation using Gerontechnology, project-based learning, and coaching-based learning, they develop and present solutions. The learning outcomes are systematically documented through roadmaps, portfolios, reflective journals, and evaluation reports to cultivate genuine integrative research competency.

Representative courses include:

- Characteristics and Application Strategies of Gerontechnology - Analyzes the characteristics of technologies such as artificial intelligence, robotics, and the metaverse, and explores strategies to compensate for or leverage age-related changes.
- Gerontechnology Transformation (GX) Design - Integrates life journeys with Gerontechnology to design transformation models for daily living.
- Futures Studies in Gerontechnology - Predicts the directions of technological development and presents future lifestyle models.
- Gerontechnology Integrative Research Methods and Seminar - Provides theoretical foundations while analyzing and discussing diverse interdisciplinary research cases.

(3) Courses for Leadership Competency Bouma (2007, p. 191) noted that “many older adults neither have the desire nor the ability to use new technological conveniences,” implying that even advanced Gerontechnology loses impact unless older adults can recognize and apply it in daily life.

Most individuals in aging stages lack a clear understanding of their own later life and the role of Gerontechnology. Thus, professionals who can guide awareness through counseling and coaching, and help individuals realize their goals

and aspirations through Gerontechnology, are essential. Such experts are termed Gerontech Planners (Shim, 2025).

This qualification not only supports students’ career development and employability but also fosters the diffusion and social acceptance of Gerontechnology through continuous, simulation-based consultations with older adults. Accordingly, the course “Gerontech Planning Counseling & Coaching” is established to provide learners with the skills to assess needs through consultation, conduct coaching-based interventions, and contribute to empirical research on planning and counseling.

The data generated from these planning sessions will be systematized into a database for developing life-technology integration models. Courses are designed to organically link aging studies, Gerontechnology concepts, case analyses, technological feature analysis, GX design, counseling and coaching, and marketing—all within the overarching vision of improving later-life living and driving innovation in aging societies.

To further promote the diffusion and implementation of Gerontechnology, the curriculum also includes:

- Gerontechnology Entrepreneurship and Management - Covers the operation and application of Gerontechnology in public, nonprofit, and for-profit contexts.
- Gerontechnology Marketing - Focuses on user-centered approaches to expanding awareness and accessibility.
- Gerontechnology Leadership and Policy - Examines the institutional environment and policy frameworks for positioning Gerontechnology as a public good, enabling students to design and implement age-appropriate, socially responsive policies.

In summary, the curriculum establishes a set of courses aligned with the three core competency domains. Grounded in the interactive dynamics between scientific and technological change and the aging process, it is designed not to teach predetermined answers but to cultivate the ability to define and solve new problems. Through this, learners develop the integrative and innovative capacities required to transform both individual later-life experiences and the broader aging society.

5) University-Industry-Research Collaboration System

With the rapid advancement of science and technology and the extension of human life expectancy, the growing healthy life span is accelerating a paradigm shift toward prevent-

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ing, compensating for, and caring for aging through Gerontechnology to enhance quality of life. Graduate-level Gerontechnology research must evolve into Gerontechnology Futures, an inquiry-based discipline that predicts future changes and explores how science and technology can be applied and adapted within human life contexts.

The aim of this graduate program is to establish an academic foundation for integrated research on individual change, technological change, and societal change. As Fozard noted, education in Gerontechnology should be experiential and interactive, enabling learners to construct knowledge through participation rather than passive instruction (Bouma et al., 2010).

Accordingly, the curriculum is grounded in constructivist learning theory, enabling learners to build new knowledge through experience, inquiry, reflection, and collaboration. This approach extends to applied research that emphasizes understanding diverse experiences and roles from the perspectives of aging individuals, providers, and intermediaries (Gerontechnology Planner, Coordinator, Consultant) - key stakeholders in Gerontechnology.

Learners repeatedly conduct gerontechnology life simulations and projects within the framework of Gerontechnology Life Planning to explore and reconstruct the contextual relationships among aging, technology, and society. Through these activities, they develop the ability to conceptualize real-world interactions and propose actionable, evidence-based solutions.

(1) University-Industry-Research Collaboration Platform

To integrate education and research, the graduate program establishes a University-Industry-Research Collaboration Platform designed as a multilayered network consisting of the following components:

- Government and Local Authorities: Participate in public and national R&D projects related to aging policy and Gerontechnology initiatives.
- Nonprofit and For-profit Organizations: Conduct joint projects for planning, R&D, and delivery of Gerontechnology products and services.
- Gerontechnology Database: Build and maintain open data systems for accumulating empirical and planning data applicable to development and policy design.
- Gerontechnology Research Institute & ISG Korea Chapter: Serve as hubs for international collaboration and scholarly exchange.

At the center of this network, the graduate school functions as the operational hub of the

Gerontechnology Research Platform, coordinating participating institutions according to their roles in research development, policy realization, field implementation, and social dissemination. This structure creates a practical research ecosystem in which academic inquiry, industrial practice, and policy application are conducted concurrently.

(2) Research and Innovation Integration

Research topics are derived from real-life issues identified during the Gerontechnology Planning process. Students collaborate with companies and institutions to carry out joint research projects within this platform, focusing on empirical studies that integrate Digital Transformation (DX), Artificial Intelligence Transformation (AIX), and aging-related innovations.

Outcomes from these projects are expanded into new models for Gerontechnology R&D, policy development, and business innovation—both domestically and internationally. Participants thus gain practical experience and multidisciplinary expertise across their respective professional domains.

Furthermore, research results are disseminated through presentations and publications at the International Society for Gerontechnology (ISG) and related international conferences, thereby elevating the global visibility and academic standing of Gerontechnology education and research in Korea.

6) Expert Validation of Content Validity

To ensure the content validity of the proposed Gerontechnology Graduate Program curriculum, this study applied the Content Validity Index (CVI) method proposed by Fehring (Fehring, 1987).

The Fehring method quantitatively evaluates the degree to which each educational component aligns with the intended educational objectives and learning context through expert panel assessment.

It is widely recognized in academia as a valid procedure for verifying both the structural relevance and content appropriateness of an educational framework.

(1) Evaluation Procedure

Expert panelists were asked to assess the question: "Can the competencies proposed in this curriculum realistically be achieved through the course as designed?"

Responses were rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

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The following eight items were used to evaluate the curriculum's validity:

- Acquisition of competencies for comprehensively understanding and responding to later-life changes.
- Acquisition of competencies for understanding and applying the concepts of Gerontechnology.
- Ability to design and conduct research on models integrating science, technology, and later-life experiences.
- Development of practical competencies for planning and developing Gerontechnology applications.
- Ability to formulate policies and lead social dissemination of Gerontechnology.
- Strengthening of industrial competencies in Gerontechnology marketing and management.
- Enhancement of career competitiveness and qualification as a Gerontech Planner.
- Overall evaluation of the curriculum's alignment with the goal of fostering integrative Gerontechnology professionals who drive innovation in aging societies.

(2) Expert Panel Composition

To ensure a high level of content validity and interdisciplinary representativeness, a panel of 21 experts was purposefully selected. The selection criteria required all participants to possess a minimum of five years of professional or research experience in domains relevant to Gerontechnology. The panel was equally divided into three specialized groups (n=7 each) to capture diverse perspectives. The first group consisted of faculty members and instructors holding doctoral degrees in disciplines such as gerontology, social welfare, psychology, and residential environment. The second group included master's and doctoral candidates specializing in gerontechnology, representing the learner's perspective. Finally, the third group comprised industry professionals from sectors including robotics, healthcare, and the product industry, ensuring the curriculum's alignment with practical field demands.

(3) Calculation and Interpretation

The Content Validity Index (CVI) for each of the eight evaluation items was calculated using the quantitative method proposed by Fehring (1987). Each response on the 5-point Likert scale was assigned a proportional weight (5 = 1.00, 4 = 0.75, 3 = 0.50, 2 = 0.25, 1 = 0.00), and the CVI values were derived accordingly. In accordance with commonly accepted standards in educational and health sciences research, a CVI value of 0.78 or higher was predefined as the threshold for acceptable content validity.

This procedure ensures that each component of the proposed gerontechnology curriculum demonstrates both theoretical relevance and practical applicability to the needs of an aging society.

(4) Purpose and Implications

This validation process examined whether the proposed curriculum faithfully reflects academically sound educational objectives and whether the targeted competencies align with actual requirements in learning and industrial contexts. The consensus-based CVI results provide empirical evidence that the Gerontechnology Graduate Program achieves both structural validity and substantive validity, confirming the curriculum's appropriateness and coherence as an academic framework for professional training in Gerontechnology.

RESULTS

As a result of the study, three major competency areas were derived for the Gerontechnology Graduate Program.

The curriculum was organized into a total of 12 courses and a thesis supervision module, consisting of three courses for Foundational Competency, five for Life and Technology Integration Competency, and four for Gerontechnology Leadership Competency.

The curriculum is structured around a minimum core of six required courses (18 credits) and six elective courses (18 credits), ensuring both academic rigor and flexibility. This structure represents the minimum configuration of the program and may be further refined as student composition and enrollment increase over time.

While all students share a common foundational core, the curriculum supports differentiated learning pathways tailored to students' prior competencies and professional goals. To illustrate this flexibility, two representative pathways are presented.

- **Policy and Planning Track** (for students with a background in Gerontology): Students begin with Introduction to Gerontechnology, progress through courses focused on Life and Technology Integration, and culminate in Leadership and Policy in Gerontechnology. This pathway is designed to develop advanced competencies for policy design, institutional planning, and leadership in aging-related social systems.
- **Technology Development Track** (for students with a background in Engineering or Advanced Technology): Students first engage with foundational aging studies through Study of Aging Stages and Later-Life Living, followed by Tech-

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Table 1. Curriculum structure of the Gerontechnology graduate program

Competency	Course	Credits (R/E)	Description
Foundational Competency	Study of Aging Stages and Later-Life Living (Advanced Gerontology)	3 (R)	Based on gerontological theories, this course analyzes changes in living and lifestyle caused by aging and disabilities, examines complex characteristics, and discusses the necessity, directions, and strategies for effective adaptation.
	Introduction to Gerontechnology	3 (R)	Provides a comprehensive understanding of the definition, scope, current status, development, education, and industry of gerontechnology, identifying its distinctive characteristics, necessity, directions, and strategies.
	Case Studies in Gerontechnology	3 (E)	Examines applied and interdisciplinary research cases of gerontechnology and analyzes examples of convergence and implementation.
Life and Technology Integration Competency	Technology Characteristics and Application Strategies in Gerontechnology	3 (R)	Examines the characteristics of advanced technologies and explores how these technologies can be used to solve problems in daily life and meet new needs in later years.
	Gerontechnology Transformation (GX) Design	3 (E)	Discusses service design thinking, methods, and techniques for transforming life (X) using Gerontechnology (G), integrating AI, robotics, and digital services into later-life living. GX (Gerotech Transformation) refers to transforming later life through technology while considering the specific characteristics of aging.
	Gerontechnology Futures	3 (R)	Addresses futures research methods by exploring possibility, desirability, and uncertainty from cognitive and normative perspectives; discusses social change structures and forecasting methods for future technologies.
	Gerontechnology Convergence Model Research	3 (R)	Utilizes qualitative, quantitative, and foresight methods to design, implement, evaluate, and improve life-enhancement models for achieving goals in later life.
	Seminar on Gerontechnology Convergence Models	3 (E)	Discusses major issues in gerontechnology, convergence of emerging technologies, and diverse lifestyle models, with students presenting and debating relevant research.
Gerontechnology Leadership Competency	Gerontechnology Planning, Counseling & Coaching	3 (R)	Examines counseling theories and psychological approaches to older adults and discusses planning methods that integrate gerontechnology into their lives appropriately.
	Leadership and Policy in Gerontechnology	3 (E)	Explores how gerontechnology contributes to individual and social well-being, examines effective policy-making processes, and discusses how to integrate science and technology for leadership and resource utilization.
	Entrepreneurship and Management in Gerontechnology	3 (E)	Analyzes business models, marketing, investment, and management strategies for both profit and nonprofit enterprises in the gerontechnology sector.
	Gerontechnology Marketing	3 (E)	Analyzes consumers' psychological and behavioral characteristics, product and service preferences, technology readiness and acceptance, and discusses marketing strategies and mix for gerontechnology.
	Thesis Supervision	12 (R)	Provides advanced research guidance under International Society for Gerontechnology (ISG) Grandmasters, covering research design, ethics, publication guidance, and thesis writing.

nology Characteristics and Application Strategies, and ultimately Gerontechnology Convergence Model Research. This pathway enables students to bridge technical innovation with the

lived experiences, needs, and safety considerations of older adults.

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This flexible configuration allows the program to function as a pioneering academic platform that responds to diverse learner profiles while maintaining a shared conceptual and competency-based foundation for all graduates.

The evaluation by expert groups demonstrated high levels of agreement regarding curriculum validity.

- Faculty CVI = 0.911, Student CVI = 0.907, and Industry CVI = 0.896, with an overall mean CVI > 0.905, indicating strong content validity.
- The within-group standard deviation (SD = 0.119) and variance (0.014) suggest consistency among evaluators.

These results confirm that the developed curriculum adequately reflects the academic objectives of Gerontechnology education and the practical competency requirements of industry and society.

DISCUSSION

Building on the conceptual foundations outlined in the Introduction, the Discussion focuses on how expert evaluations support the effectiveness and practical relevance of the proposed curriculum. The following sections interpret the CVI results and qualitative feedback in relation to curriculum balance, interdisciplinary integration, and professional applicability, aligning with Fozard's emphasis on linking education with research and development (R&D) in advancing gerontechnology.

1) Curriculum Balance and Expert Evaluation

According to expert evaluations, the program was assessed as highly appropriate for achieving its key competencies.

Some respondents suggested that "more courses addressing the complex changes of later life" would strengthen the program.

To reflect this, the course Study of Aging Stages and Later-Life Living was designed to integrate theoretical foundations of aging into a holistic perspective.

Rather than relying on fragmented or repetitive theoretical instruction, the curriculum adopts a progressive structure where students engage with the dual axes of aging transitions and technological transitions through a series of interconnected courses such as Introduction to Gerontechnology, Case Studies in Gerontechnology, Technology Application Strategies, GX Design, Gerontechnology Futures, and Convergence Model Seminars.

This iterative exposure enables learners to build increasingly deeper and more balanced conceptual understanding.

2) Expert Panel Insights

Among faculty evaluations, the lowest CVI (.829) was recorded for the item "Ability to design and conduct integrative research combining science, technology, and later-life living."

Several experts commented that such integration may be difficult due to the relative scarcity of established interdisciplinary research in this domain.

This observation suggests that achieving high-level integration between technology and gerontology remains a challenging but essential task.

In this respect, the curriculum is expected to evolve through continuous research-based enhancement.

It follows Bruner's (1960) Spiral Curriculum theory, which encourages revisiting core concepts across multiple contexts, each time at a higher level of abstraction and application.

Furthermore, the simultaneous application of both forward-looking and backward (future-back) approaches (Robinson, 1990) is recommended, addressing the dynamic interaction between aging over time and technological evolution, thereby cultivating learners' temporal problem-solving and foresight capabilities.

From the students' perspective, CVI scores were generally high (CVI >.857), indicating strong alignment between learning outcomes and perceived relevance.

Among industry participants, the lowest score (.829) was observed for "Improvement of career competitiveness and qualification as Gerontechnology Planner."

This relatively lower score likely reflects the current absence of a nationally certified credential; however, the result still indicates a high perceived value of the qualification within the field.

These expert perspectives should be interpreted in relation to the Korean educational and industrial context described in the needs analysis.

3) Implications

Overall, the proposed curriculum moves beyond theoretical knowledge delivery toward problem-oriented, reality-based learning and future scenario development. It promotes integrative thinking and equips learners with practical capabilities to address complex challenges in later life. The high CVI scores across diverse expert groups further validate that this competency-based model is not only academically sound but also highly relevant to current

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Table 2. CVI results for curriculum component validation by expert group

Item	CVI (Faculty)	CVI (Student)	CVI (Industry)	CVI (Mean)	SD	Variance
Q1	0.886	0.914	0.943	0.914	0.023	0.013
Q2	0.943	0.914	0.886	0.914	0.112	0.013
Q3	0.829	0.857	0.914	0.867	0.138	0.019
Q4	0.914	0.914	0.857	0.895	0.113	0.013
Q5	0.943	0.886	0.914	0.914	0.112	0.013
Q6	0.914	0.914	0.857	0.895	0.113	0.013
Q7	0.914	0.914	0.829	0.886	0.109	0.012
Q8	0.943	0.943	0.971	0.952	0.084	0.007
Mean	0.911	0.907	0.896	0.905	0.119	0.014

industrial demands. Hence, the program offers a robust educational framework for cultivating professionals who can lead innovation in aging societies through the creative convergence of science, technology, and human life.

CONCLUSION

This study proposed the educational foundation and curriculum design for establishing a Graduate Program in Gerontechnology in response to the rapid aging of Korean society. The program aims not merely to develop age-friendly technologies, but to cultivate professionals capable of addressing the complex changes of an aging society through an in-depth understanding of aging and the integrative application of advanced science and technology. By exploring the interactions among aging, human life, and technology, this program seeks to nurture leaders who can demonstrate competence across research, policy, and practice.

The curriculum was designed around the philosophy and mission of Gerontechnology, balancing academic advancement with social applicability. It was structured through a multi-layered design that reflects the needs of society, learners, and professional institutions. The model integrates three core educational pillars:

- (1) the balance between foundational gerontology and advanced convergence technology education,
- (2) simulation-based experiential learning, and
- (3) the cultivation of future-oriented and anticipatory thinking.

References

Bouma, H., Fozard, J. L., Bouwhuis, D. G., & Taipale, V. (2007). Gerontechnology in perspective. *Gerontechnology*, 6(4), 190-216.

Bouma, H. (2012). Foundations and goals of Gerontechnology. *Gerontechnology*, 11(1), 1-4.

Bouma, H., Fozard, J. L., & van Bronswijk, J. E. M. H. (2009). Gerontechnology as a field of endeavour. *Gerontechnology*, 8(2), 68-75.

Bouma, H., Rietsema, J., & Tuan, P.-C. (2010). James L. Fozard PhD as educator in gerontechnology. *Gerontechnology*, 9(3), 361-364.

Bronswijk, J. E. M. H., Bouma, H., Fozard, J. L., Kearns, W. D., Davison, G. C., & Tuan, P. C. (2009). Defining Gerontechnology for R&D Purposes. *Gerontechnology*, 8(1), 3-10.

Bruner, J. S. (1960). *The process of education*. Harvard University Press.

Through this framework, the program establishes a differentiated educational model that bridges theory and practice.

Moreover, by strengthening competencies in technological foresight, Gerontechnology Transformation (GX) design thinking, and later-life planning, the curriculum aims to bridge the gap between conceptual understanding and practical implementation, thereby fostering educational outcomes that drive meaningful social transformation.

This study holds both academic and social significance as a starting point for formalized Gerontechnology education in Korea. Future research should include empirical validation of educational effectiveness, learning outcome-based evaluation, and international comparative analyses. Such efforts will enhance the validity and sustainability of the program and promote its evolution into an interdisciplinary professional education model leading the future of aging societies.

Ultimately, graduates of this program are expected to play leading roles across diverse fields-including Gerontechnology Life Planning counseling and coaching, welfare and care services, research and development, business innovation, and policy implementation. Through these roles, they will contribute to solving human-centered challenges of aging and environmental change, meeting evolving needs, and creating tangible life achievements. As a result, the perception of later life will improve, the quality of life for individuals and families will be enhanced, and a healthy and fulfilling aging society will be realized.

Çakır, M. (2008). Constructivist approaches to learning in science and their implications for science pedagogy: A literature review. *International Journal of Environmental & Science Education*, 3(4), 193-206.

Fehring, R. J. (1987). Methods to validate nursing diagnoses. *Heart & Lung: The Journal of Critical Care*, 16(6), 625-629.

Fozard, J. L. (2002). Gerontechnology - Beyond Ergonomics and Universal Design. *Gerontechnology*, 1(3), 137-139.

Graafmans, J. A. M., Fozard, J. L., Rietsema, J., van Berlo, A., & Bouma, H. (1994). Gerontechnology: matching the technological environment to the needs and capacities of the elderly. Eindhoven University of Technology.

International Society for Gerontechnology. (2025). *About Gerontechnology*. Retrieved November

Establishing a gerontechnology graduate program in Korea

- 9, 2025, from <https://www.Gerontechnology.org/about/>
- Kort, H. S. M. (2009). Fun Technology Master Class. *Gerontechnology*, 8(2), 124.
- Ministry of Science and ICT. (2023). AI transformation strategy for future industries. Seoul, Republic of Korea.
- Norton, R. E. (1997). DACUM handbook. The Ohio State University.
- Robinson, J. B. (1990). Futures under glass: A recipe for people who hate to predict. *Futures*, 22(8), 820-842.
- Shim, W.-J. (2025). Gerontech Planner – Level 1: Textbook Beta Edition [Unpublished textbook]. KAPASS Gerontech R&D Institute.
- Statistics Korea. (2025). Resident registration population statistics: Population aged 40 and older (As of September 2025). Korean Statistical Information Service (KOSIS). <https://kosis.kr/>
- Tyler, R. W. (1949). Basic principles of curriculum and instruction. University of Chicago Press.
- Vial, G. (2019). Understanding digital transformation: A review and research agenda. *Journal of Strategic Information Systems*, 28(2), 118-144.
- World Health Organization. (2001). International classification of functioning, disability and health: ICF. World Health Organization. <https://apps.who.int/iris/handle/10665/42407>
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