Establishment of Creative Convergence Curriculum for Systematic Management of MZ Generation

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Abstracts: A new generation of creativity (New-Collar) has arrived, not White-Collar or Blue-Collar. The main characteristics of the creative generation are the Fourth Industrial Revolution, the generation that makes good use of digital content and digital devices, expresses their tastes and colors well, and produces and consumes new things. Interest in Metaverse education that is scalable and realistic beyond space-time boundaries is growing, with the advent of the new normal era, in which non-face-to-face training has become every day's work. With the technology development, the emergence of new educational services, and the changes in the environment at that time, the Metaverse education develops in various forms and is used in a variety of meanings. For this motivation, this study intends to examine earlier studies including curriculum procedures and present a model for creating a future creative convergence theme through a questionnaire. In addition, we intend to create a blueprint for convergence of university creativity and develop a plan to promote the design of creative convergence themes for the digital generation. This study is intended to help educational institutions think about designing curricula for the digital generation.

Keywords: Convergence, Creativity, Curriculum, Digital Generation, MZ Generation.

1. INTRODUCTION

Recently, the convergence (Herr et al., 2019) (Ko et al., 2012) of new technologies has created a New Digital Divide Education World. In addition, reality and virtuality are united to create a new business economy ecosystem. However, education in the school field is somewhat insufficient to reflect this trend of the times. Recently, corporate trends tend to prefer convergence-type talents that combine corporate work capabilities and information and communication technology (ICT) capabilities by utilizing new technologies and tasks very closely. We think that the Millennials and Gen Z (MZ) generation (Shin.2022) (Jun et al., 2021) these days is not a white or blue generation, but a generation of new color convergence creativity. In addition, it is a generation of convergence technologies that can utilize digital devices that incorporate core technologies in the Fourth Industry (Xu et al., 2018) (Morrar, et al., 2017). It is judged that the time has come to focus on fostering creative and convergent talents for future education. In other words, students at universities are the MZ generation as a creative class generation nowadays. In addition, various infrastructures should become a central platform for value creation, as creative convergence shows various results to local communities and industries through the promotion of meta-structures. Metaverse (Matthew, 2021) (Lee et al., 2021; Wang, & Wu, 2022) is implemented through the organic linkage of various ICT technologies such as Extended Reality (XR), Artificial Intelligence (AI) (Minsky, 1961) (McCarthy & Hayes, 1981), Bigdata (Sagiroglu & Sinanc, 2013) (George et al., 2014) (Oh, 2015) (Jeong et al., 2020) (Kang & Jung, 2016) (Lee & Han, 2019) (Lee, 2020), 5 Generation (5G) Network, Cloud, Digital Twin and Blockchain. The decline in the school-age population is approaching a major crisis for local universities. Preparing a new creative convergence education subject is not a choice, but a problem related to the survival of universities.

2. RELATED WORKS

2.1. New Education Technology and Operation Cases

Education investment is spreading focusing on core technologies such as XR, AI, Blockchain, Cloud, Bigdata, and Digital Twin that implement Metaverse. In the case of the United States, the Innovation Competition Act (USICA) to strengthen the overall capabilities of the United States, such as technology, industry, and security, included XR and AI as key technology concentrations. By announcing the American AI Initiative as an executive order of the federal government, it is also expanding research and development and education investment in AI. The National Advisory Committee on Science and Technology (NACST) recognized Digital Twin as a key element of future factories and suggested strategies to strengthen manufacturing competitiveness. In addition, it has been

seeking to strengthen 6 Generation (6G) technology cooperation with major allies since it began long-term research and development of 6G led by the Higher Research Planning Agency (DARPA) under the Ministry of National Defense. The European Union (EU) announced Horizon Europe as a follow-up to the 'Horizon 2020 Project' and is promoting research support and encouraging the use of digital technologies such as XR, AI, and Bigdata. As a digital era strategy that encompasses AI and Bigdata (Ayub, Mumtaz, Ahmad, & Abdullah, 2021), the 'European Data Strategy and Artificial Intelligence White Papers' were published, and seven member countries (France, Italy, Greece, Spain, etc.) adopted a joint declaration for the active introduction of Blockchain technology. China selected the XR industry as a key digital economy industry for the next five years through the 14th Five-Year Plan for National Economic/Social Development and the long-term goal code in 2035. The government-led central Blockchain service platform Blockchain Service Network (BSN) has begun to be commercialized. It announced the 'Next Generation AI Development Plan', a national strategy aimed at reaching the world's leading level in the AI field and becoming a global AI innovation center by 2030. South Korea has announced the 'Korean Version of the New Deal 2.0 Promotion Plan' and is pushing for fostering new hyper-connected industries such as Metaverse as a key task. It has established a 'Virtual Convergence Economy Development Strategy' and is investing heavily in spreading the use of XR throughout the economy and society, expanding leading XR infrastructure and maintaining institutions, and securing corporate competitiveness. It is also promoting the creation of an AI innovation ecosystem and convergence between Bigdata and AI by establishing a 'Data and AI Economy Revitalization Plan' and 'AI National Strategy'.

2.2. Competition to Strengthen Market Dominance

A social media company, Facebook, changed its company name to 'Meta' and changed its identity from a social platform company to a Metaverse platform company. Google and Apple are making all-out efforts to build their own Metaverse platform, breaking away from their monopoly on mobile platforms. Meta is building a new user-centered Metaverse ecosystem through vertical integration in all fields such as platforms, devices, and services and concentration of company-wide capabilities. Microsoft is expanding its business area by announcing Metaverse-specific solutions and aims to provide comprehensive Metaverse solutions. In addition, it is advancing into the Metaverse business centered on Business-to-Business (B2B) and Business-to-Government (B2G) through the linkage of its core technologies and services such as platforms, devices, and clouds. NVIDA is taking advantage of its core capabilities to become a leading Metaverse company centered on technology infrastructure. Based on its unique technology such as Graphic Processing Unit (GPU) and AI, it is attempting to expand the Metaverse ecosystem centered on Information Technology (IT) infrastructure. Apple is actively investing in and developing devices and services to gradually expand its current strong mobile platform (iOS) ecosystem to Metaverse, and is applying for a number of patents related to Head Mounted Display (HMD). Google is preparing for Metaverse businesses such as launching Google Earth VR services and researching next-generation new technologies necessary to build Metaverse. Naver is upgrading its existing platform to user participation, building an ecosystem that combines various technologies such as AI, robots, cloud, 5G, and augmented reality, and activating the Zepeto platform. Kakao is attempting to merge the virtual economy with the real economy based on Kakao community services (Blockchain, entertainment, finance, mobility, etc.), and is promoting Blockchain platform (Clayton), non-fungible token (NFT) wallet (Clip), BaaS (Cas), and Bank of Korea digital currency pilot projects.

2.3. Metaverse, Boundary of Falling Virtuality and Reality

As an alternative to meeting non-face-to-face demand in line with the advent of the New Normal era, where non-face-to-face has become commonplace, interest in Metaverse, which has scalability and realism beyond space-time constraints, is increasing. This is drawing keen attention to the possibility that various economic and social activities that took place in the existing physical space can be expanded to the Metaverse space. Metaverse is a combination of 'Meta', which means transcendence, and 'Universe', which means the world, and first appeared in science fiction (snow crash). With the development of technology, the emergence of new services, and changes in the environment of the times, Metaverse evolves in various forms and is used in a wide range of meanings, and is understood as a world (platform) that creates economic, social, and cultural values. Just as the ICT ecosystem moved from Personal Computer (PC) to smartphone in the past, Metaverse is expected to serve as a catalyst for

innovating the entire ICT ecosystem along with changes in the ICT paradigm as a next-generation platform following smartphones. In addition, the Internet is evolving into Web 3.0 that expands into a virtual convergence space following Web 1.0 and Web 2.0, and Metaverse is being considered as a next-generation Internet platform. Metaverse is implemented through organic linkage of various ICT technologies such as XR, AI, data, 5G network, cloud, Digital Twin, and Blockchain, and expectations for Metaverse implementation are rising through the development and inter-convergence of major technologies. In addition, various infrastructure should become a key platform for value diffusion by demonstrating various results obtained by fostering Metaverse talent centered on Software (SW) convergence to the local community and industry.

3. MAJOR ISSUES & STRATEGY PROPOSAL FOR UNIVERSITY EDUCATION IN KOREA

3.1. Major Issues

Korean universities need to establish a system for developing and distributing core curriculum convergence personnel to promote digital transformation in local industries, along with improving the constitution of educational programs centered on 'education consumers' in the Metaverse era. In addition, the goal of university SW convergence education should be to recruit professors with excellent educational capabilities and practical experience and to establish a governance system to maintain SW education for all university members. One of the issues of creative convergence education is that industry-academia jointly plans projects and operates cooperative programs through on-site execution organization and operation for implementation. Regional-friendly programs such as dataset construction and Metaverse and drone experience should be designed and operated to promote digital transformation for key industries in the region where each university in South Korea is located.

If other majors other than IT are interested in digital transformation or consider employment through SW, it is necessary to provide SW convergence curriculum that can be linked or double-majored and support their smooth entry into society. At this time, it is necessary to increase and promote SW education as a necessity for all students. South Korean universities have been serving as ‘lifelong education leading universities’ by discovering the demand for convergence education for local communities and employees and operating programs, but with the advent of the new industrial era of Metaverse, they need to improve the educational environment and system. First of all, through innovation in the SW convergence education system, students, companies, and both key stakeholders such as entrance examination competition rate (student demand) and employment rate (industrial demand) should be met. In addition, it is imperative to innovate the educational method and educational environment through the design of customized educational programs by level so that the rate of self-directed learning ability of SW convergence majors can be reduced. In addition, by establishing a SW (Metaverse) + X (engineering, humanities society, health/welfare, art, tourism/management, etc.) system, it is necessary to cultivate Metaverse SW convergence professionals in various fields involving all members of domestic universities.

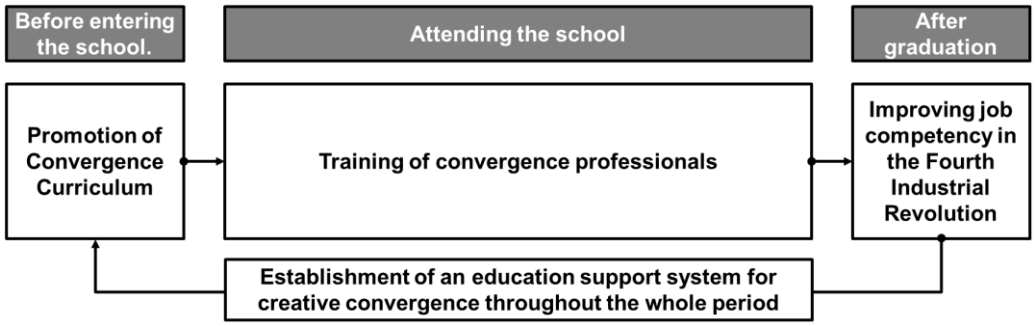

Figure 1. A virtuous cycle of convergence education curriculum.

3.2. Convergence Education Proposal

For convergence education, we have looked at the educational environment at home and abroad so far. Based on this, we propose the following system to share the value with the local community while establishing an educational environment and program to have the latest trends and capabilities required by the industry from the

moment of admission to domestic universities to graduation <Figure 1>. In addition, we would like to conduct a survey of students at Namseoul University to analyze the validity of this proposal. These efforts are expected to help establish a vision for future education subjects, prepare a future creative education curriculum system, and prepare detailed design of creative convergence subjects.

To this end, we present detailed strategies for successfully implementing the creative convergence curriculum for each area presented above <Table 1>.

Table 1. Detailed implementation strategies for creative convergence education.

Implementation Strategy		Remark
Innovation of creative convergence education system	* New convergence curriculum * Innovation of convergence talent * Training curriculum	* Establishment of a Creative Convergence College in charge of overall creative convergence education in all subjects. * Establishment of Metaverse Academy to support the creation and commercialization of Metaverse content. * Night operation of immersion education comparison course for those who wish to major in creative convergence * Opening and operating convergence courses for non-engineering majors (convergence curriculum)
	Immersion education before admission	* Establishment of creative convergence department without admissions students for advanced convergence major after completion of creative convergence education and basic education after completion of the department of creative convergence without admissions for boo/multiple/convergence/convergence/connection major.
	Basic compulsory education for convergence	* Operation of 6 credits or more of essential liberal arts courses for convergence and integration of all students. * Providing opportunities to participate in external specialized convergence education to non-professionals who wish to pursue advanced courses.
	Faculty recruitment and education	* Full-time, non-executive, and tutor (SW major students to expand convergence education) in the field of convergence. * Conducting job training in the field of creative convergence during the current full-time professor vacation.
Establishment of educational environment (including Metaverse)		* Flip learning, PBL educational environment construction, smart classroom construction without space-time constraints * Operation of maker space-type major laboratory (joint operation of industries)
Strengthening implementation-oriented industry-academic cooperation		* A joint study on the development and coding of university and corporate industry common curriculum * Technical support for 3 to 5 companies with close difficulties, capstone design, and industry-academic joint project guidance for each full-time professor of SW convergence-related departments. * Strengthening club activities and activating industry alumni mentoring
Strengthening university competitiveness		* When operating local elementary, middle, high, and general SW camps, ai drone competitions and Metaverse game competitions are jointly held in conjunction with nearby universities. * Spreading community values - Visiting drone camp for elementary and secondary students (experience type) - VR and AR mentoring and visiting VR and AR experience classes are operated. * Contest to discover new SW convergence content ideas such as solving local problems and experiencing Korean culture. * Supporting the use of regional specialized IP and public data in cooperation with local universities and public institutions.

4. STUDENT SURVEY AND CURRICULUM ESTABLISHMENT

4.1. Student Survey and Results

In order to conduct this teaching method study, a questionnaire was constructed by referring to the case of previous research review, and it was verified through a review meeting of participating researchers. As a result of conducting a survey of Namseoul University students (1st to 4th graders) from October 24 to October 27, 2022, a total of 357 people responded to the survey. The data collected in this study were analyzed using the questionnaire form of Naver Office. The composition of the questionnaire is the general characteristics of the respondents, factors influencing the enrollment, the effect of online community Everytime on enrollment, efficient class form in the

Corona era, and creative convergence of creativity. It was divided into items of complex preferred subjects and consisted of a total of 15 questions as shown in <Table 2>.

Table 2. Questionnaire design items.

Item	Remark
General characteristics of respondents	Gender, department, grade
Factors affecting the course registration	Criteria for selecting courses, degree of reference to lecture plans, factors determining the course, etc.
Impact of the online community on enrollment	Whether every time is used, the effect of every time on enrollment, the reliability of every time's subject evaluation, the reliability of every time's teaching evaluation, etc.
Effective teaching methods in the COVID-19 era	Face-to-face, non-face-to-face class satisfaction, class satisfaction in the COVID-19 era, and the necessity of providing non-face-to-face classes after COVID-19.
Study on the demand for convergence and combined preference subjects	Identifying the demand for subjects requiring convergence in engineering and non-engineering sectors, identifying the demand for new technology subjects, and identifying satisfaction through subjects.

The survey results derived five major implications as follows; (1) Establishment of a creative convergence education curriculum support system for pre-admission (pre-admission, study, employment, and re-employment), (2) Expansion and operation of education and subjects in the cyber world, (3) Systematic management of online community teaching evaluation is required, (4) Demand to discover new educational platforms such as Metaverse and innovate teaching methods, and (5) Compilation of various new subjects that are integrated with core technologies of the 4th Industrial Revolution. Due to the decrease in the school-age population, local universities are putting a lot of time and effort into attracting students every year. However, the educational support system in the school field remains in the past support method with fragmentary and temporary support, so it is somewhat insufficient to reflect the trend of the times. Recently, corporate trends prefer convergence-type talent that uses new technologies and tasks very closely, that is, combines corporate work capabilities and information and communication technology (ICT) capabilities. It is urgent to promote convergence subjects before admission, complete convergence courses separately from majors, and prepare a ‘pre-circulation creative convergence and complex curriculum support system’ that allows follow-up management after employment. Amid social changes such as With-Corona and the decrease in the school-age population, students are becoming more familiar with online exchanges, and it is becoming more common to find information sharing on overall class subjects on cyber. Now, overall changes in university subjects such as cyber education and curriculum organization are taking place as much as in the field of real education. In addition to face-to-face lecture rooms, it is necessary to prepare a curriculum operating system such as cyber lecture rooms. It has been confirmed that the influence of the online community is very great for students who acquire school-related information and learn management activities through smartphones. In addition, it should be noted that the reliability of information on the teaching reviews and subject contents provided at Everytime is very high, which can affect the course decision. Professors need self-reflection, referring to popular courses in online communities and the MZ generation's information acquisition method about the professor's reputation. The most common form of university class is the form of delivering curriculum contents in the classroom through textbooks and presentation files. However, for the MZ generation, who are accustomed to delivering images and visual information rather than communicating through text, efforts by professors are needed to overcome cultural delays in delivering knowledge. In addition, it is necessary to establish a ‘Metaverse Academy’ to support the creation and commercialization of Metaverse content. The teaching method also requires night operation of the immersion education comparison course for those who wish to major in creative convergence. The MZ generation is a generation of convergence technologies that can utilize digital devices that incorporate core technologies of the 4th Industrial Revolution. It is necessary to organize a wide range of new subjects such as intelligent Bigdata, Metaverse convergence management, virtual enhancement, bio-health, smart farm, virtual world, prom-tech, smart autonomous driving, and fin-tech. It is judged that the time has come to focus on fostering creative and convergent talents for future education.

4.2. Curriculum Establishment

As discussed above, in order to establish a future creative convergence subject, it is to create a creative

convergence goal. This is summarized as the establishment of a university and university-linked hub for fostering creative convergence professionals. (1) First of all, it is necessary to establish a new education (real and virtual) environment. It is necessary to establish a life cycle meta-experience center from admission promotion to employment, and it is necessary to operate not only the real world but also the meta-experience center such as virtual world admission, classes, and employment. (2) It is urgent to prepare a curriculum system for creative convergence. It is necessary to establish a new subject for major, minor, convergence major, and linked major centering on the existing department. It can also be a way to establish a Metaverse + X (all departments) type-linked major in liberal arts colleges. In addition, AI-based edu-tech utilization and self-development are required to acquire learning skills. (3) An implementation-oriented industry-academic cooperation system should be established. It is necessary to share Research & Development (R&D) know-how, which has already been completed, and a plan to provide close technical support for three companies per professor, focusing on family companies, should also be studied. In particular, industry-academic joint laboratory based on patent-centered intellectual property sharing should be operated, and industry-academic integrated projects should be carried out step by step. (4) The Metaverse architecture should be operated. For Metaverse planning, it is necessary to understand the field related to the concept of Metaverse, and for Metaverse production, it is also necessary to understand the major technologies related to Metaverse architecture construction. Efforts should also be made to understand the main functions and utilization methods of major Metaverse solutions for Metaverse production.

5. CONCLUSIONS

As the result of this study, it is necessary to establish a convergence university and convergence graduate school to foster creative talent in line with the changes of the times, and comprehensive and systematic curriculum operation and management are urgently needed. Due to the decrease in the school-age population, local universities are putting a lot of time and effort into attracting students every year. However, the educational support system in the school field remains in the past support method with fragmentary and temporary support, so it is somewhat insufficient to reflect the trend of the times. Recently, corporate trends prefer convergence-type talent that uses new technologies and tasks very closely, that is, combines corporate work capabilities and information and communication technology (ICT) capabilities. It is urgent to promote convergence subjects before admission, complete convergence courses separately from majors, and prepare a ‘pre-circulation creative convergence and complex curriculum support system’ that allows follow-up management after employment. In addition, amid social changes such as With-Corona and the decrease in the school-age population, students are becoming more familiar with online exchanges, and it is becoming more common to find information sharing on overall class subjects on cyber. Now, overall changes in university subjects such as cyber education and curriculum organization are taking place as much as in the field of real education. In addition to face-to-face lecture rooms, it is necessary to prepare a curriculum operating system such as cyber lecture rooms. The most common form of university class is the form of delivering curriculum contents in the classroom through textbooks and presentation files. However, for the MZ generation, who are accustomed to delivering images and visual information rather than communicating through text, efforts by professors are needed to overcome cultural delays in delivering knowledge. In addition, it is necessary to establish a ‘Metaverse Academy’ to support the creation and commercialization of Metaverse content. The teaching method also requires night operation of the immersion education comparison course for those who wish to major in creative convergence.

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