

## A Study on Education Utilizing Metaverse for Effective Communication in a Convergence Subject

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### Abstract

*Since the first semester of 2020, domestic and overseas universities mostly provided untact online classes and limitedly provided face-to-face classes due to COVID-19 in operating courses. The convergence subjects provided in undergraduate courses attach importance to contents-centered, design-based, hands-on education, and field experience. In the situation where online education was not revitalized, instructors in charge of convergence subjects had difficulty in developing online class materials, and students' satisfaction with the classes was not high. Especially, a problem was raised that students taking the convergence subjects that included practice had difficulty in communicating with the instructors. We would investigate the present condition of distance learning in domestic universities, which came suddenly due to the global pandemic of infectious disease and make suggestions for effective distance learning in the coming era of Metaverse by emphasizing the interaction and communication between instructors and learners through an analysis of distance learning of a convergence subject.*

**Keywords:** Hands-on Education, Virtual Laboratory, Distance Learning, Metaverse

### 1. Introduction

To train talent that will live in the era of the 4<sup>th</sup> industrial revolution, universities make various efforts. Especially, they attempt to develop comprehensive designs and convergence subjects and apply the appropriate teaching-learning methods so that students can learn the topics based on social demands and promote problem-solving competence. In addition, it is expected that demands for talent with basic knowledge of mathematics and sciences will continuously increase in a future society where cutting-edge science technologies like artificial intelligence, etc. will become common, and the education infrastructure for the characteristics of future generations is still insufficient [1]. Especially, a problem was raised that the students taking convergence subjects that included practice had difficulty in communicating with instructors. This study checked the importance and necessity of the interaction and communication between instructors and learners through the status of distance learning in domestic universities and a case study of distance learning of convergence subjects. This study would propose the utilization of Metaverse for effective communication in untact classes and introduce cases of the application of Metaverse to education for enrolled students for smooth communication and interaction in an untact educational environment with the artificial intelligence convergence subject.

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## 2. Main Text

### 2.1. The Concept of Distance Learning and the Status of Domestic Universities

Distance learning is defined as “a form of class in which teaching-learning activities are done at different times or spaces while the instructor and learners do not meet face-to-face.” In fact, distance learning has existed in various forms before COVID-19, and the present state of its development is divided into three according to the medium for delivering content as follows[2].

■ E-Learning (Electronic Learning): Internet-based learning environment and education in which there are no restrictions in time and space through information and communication technology (ICT), and learning by level is possible through interaction and self-directed activities breaking from the supplier-oriented method.

■ M-Learning (Mobile Learning): Learning environment and education utilizing portable wireless media, such as personal digital assistant (PDA), tablet PCs, and smartphones, etc.

■ U-Learning (Ubiquitous Learning): Human-centered customized education in which people can learn in any form they want, anywhere and at any time in daily life.

The present state of the development of distance learning is shown in Figure 1.



**Figure 1. Status of the development of distance learning according to the medium for delivering contents**

To sum, openness (No time/space constraints), flexibility (learner autonomously decides the progress and learns self-directed), dispersibility (utilizing various learning resources in several places) are the main points of distance learning. Thus, through it, learners accumulate and combine a variety of knowledge and share it with others with communication and empathic ability. Most of all, to train creative talent who can find solutions flexibly and elastically in a future society where the fourth industrial revolution will have been developed at high speed, the expansion of distance learning platform can be said to be a kind of stream of the times, not just because of COVID-19[2].

The status of distance learning is as follows: According to a survey of “awareness, utilization, and experience of distance learning” conducted online from August 10 through 14, 2020 with faculty members (2,881 persons) and students (28,418 persons) at universities nationwide by the Ministry of Education, as for the top difficulties in distance learning, learners responded, “lacking communication with the instructor and other learners” (59.2%) and “decline in concentration” (54.3%), while instructors responded, “operating class according to the characteristics of the subject” (45.7%) and “motivating and students’ learning and inducing their participation” (45.6%). Both instructors and learners complained that it was difficult to communicate in

distance learning [3]. In other words, it can be inferred that to arouse students' interest to increase the effect of distance learning, the interaction and communication between instructors and students can be the key as shown in Table 1.

**Table 1. Difficulties in distance learning by reason (Students)**

Reason	Very difficult	Some what difficult	Neither easy nor difficult	Not difficult	Not difficult at all	Have difficulty	Have no difficulty
Lack of communication with the instructor or other learners	30.0%	29.2%	24.7%	10.6%	5.5%	59.2%	16.1%
Decline in concentration in distance learning	22.4%	31.9%	25.5%	14.3%	5.9%	54.3%	20.2%
System instability like bad connection or disconnection	22.3%	27.4%	25.2%	16.8%	8.3%	49.7%	25.1%
Difficulty in task performance	20.5%	24.3%	29.5%	17.4%	8.3%	44.8%	25.7%
Increase in fatigue with learning utilizing digital devices	20.5%	23.2%	26.1%	19.8%	10.4%	43.7%	30.2%
Decrease in the amount of learning with less coercion compared to face-to-face class attendance	16.1%	19.4%	29.2%	22.8%	12.5%	35.5%	35.3%
Absence of a stable place to take classes	12.2%	17.0%	28.4%	28.7%	13.7%	29.2%	42.4%

## 2.2. Introduction of Metaverse in Distance Learning

Metaverse, which means a three-dimensional virtual world, is becoming a key keyword in the IT industry as times change. Metaverse, which has evolved more than virtual reality in the era of the Fourth Industrial Revolution, appears in a form in which the virtual world is absorbed into the real world on the web and the Internet [4]. Metaverse is characterized by different characters having human exchanges with avatars of social and economic software in three-dimensional virtual space [5]. Among the Metaverse designs, real characters can engage in social, economic, and cultural activities like the real world in a virtual space using the ZEPETOapp, suggesting infinite possibilities for activating virtual space [6][7]. Metaverse is also called the playground of 'Generation MZ.' Generation MZ refers to the millennial generation born between the early-1980s and the early-2000s and 'Generation Z' born between the mid-1990s and the early-2000s. Characteristically, Generation MZ is accustomed to digital environments, seeks exotic experiences different from those of others, and is sensitive to the latest trends.

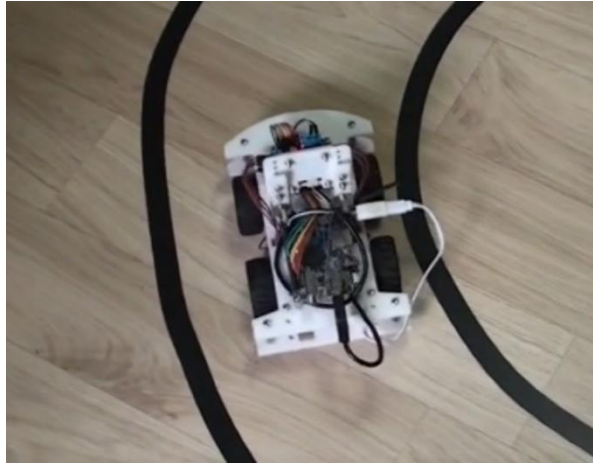
## 3. Examples of the Application of Metaverse to Corporate Education and College Education

### 3.1. Example of the Application of Metaverse to Corporate Education

As the COVID-19 situation is prolonged, there is an increasing number of companies that are active in a virtual world, Metaverse, and it is applied to education and training other than business. LG Display has



artificial intelligence hands-on subject in an untact education. The target convergence subject is “Social Issues and the Artificial Intelligence Project,” in which an autonomous driving car kit is distributed to the learners for practice in an untact environment. Students take the online contents class for seven weeks out of 15 weeks to learn theoretical content, assemble the autonomous driving car kit for seven weeks through Zoom classes and practice programming. Then, through team activities, they complete the autonomous driving car and receive an evaluation. This course improved students’ self-directedness in learning, utilizing the technology as a learning tool and pre-class through untact contents. In-class through Metaverse encouraged the promotion of the learning effect by collaborative learning based on teams.



**Figure 4. Autonomous Driving Car Implementation**

Figure 4 is an example of the learners’ assembly, implementation, and demonstration of an autonomous driving car kit provided in the untact class.

**Table 2. Changes in satisfaction with interaction in the class utilizing Metaverse**

Reason	Have difficulty Pre survey	Not difficult at all	Have difficulty Post survey	Not difficult
Lack of communication with the instructor or other learners	72%	18%	30%	70%
Difficulty in task performance	65	35	28%	72%
Ease of learning utilizing Metaverse	-	-	15%	85%

Table 2 shows that applying the course utilizing Metaverse to the convergence subject increase students’ satisfaction with their communication with instructors and peers. As for the characteristics of hands-on education, since it could resolve the problems in hand through interaction, difficulty in task performance decreases, and satisfaction with learning increases. With 80 students divided into two classes taking the target convergence subject, for the first seven weeks, their satisfaction was surveyed after doing team activities with ordinary chatting and a messenger, not utilizing Metaverse. Then, in the survey of satisfaction after doing team activities utilizing Metaverse, it was found that the numerical value of “No difficulty” increased.

## 5. Conclusions

This study investigated a case of distance learning utilizing virtual space, Metaverse to train talent through digital innovation in the era of new normal, applied this to convergence field education and efficient hands-on education. For opinion sharing between instructors and learners and efficient education in the classes, Metaverse was applied to check changes in the learners' satisfaction with the untact class. The observation that post-COVID-19 society will be different from its previous looks is dominant, and this is applied to the work pattern and education for incumbent persons as well as the traditional college education. A safe environment for economic activities and education, and a communication space for efficient business and education should be secured. To provide such safe and efficient environments for education and business, it is necessary to apply virtual reality technologies like Metaverse and continuously study and endeavor for the expansion of learning experiences.

## References

- [1] Ahn Joon-mo, "COVID19 and Innovation in Science and Engineering Universities," Science and Technology Talent Development Plan Series Forum, 2020.
- [2] Yoon heonjun, "Progress to the Metaverse Era: 04. subject New services and cooperation" ,vol. 61, no. 8, p50, Journal of the KSME, 2021.
- [3] Ministry of Education, *Survey of distance learning experience and awareness in the first semester of 2020*, Source: University Intelligence In&Out <<http://www.unipress.co.kr>> (2020).
- [4] Seo Kwang-heon, "Metaverse business model and ecosystem analysis," Electronics and Telecommunications Trends, Korea Electronics and Telecommunications Research Institute, Volume 36 No. 4 pp.81 to 91, 2021.
- [5] Kim Sang-kyun, *Metaverse-Digital Earth, World of Floating*, Plan by Design Publishing, 2020.
- [6] Shin Yuri, "Research on the discourse characteristics of Metaverse- Focusing on "ZEPETO" used by the digital indigenous generation," Collection of papers presented at the conference of the Society of Discourse and CognitiveLanguage. pp.233-238. 2021.
- [7] Kim Gokmi & Ju Hyun Jeon, "A Study on the Copyright Survey for Design Protection in Metaverse Period", vol.10, no.3, pp. 185, 2021.
- [8] <http://www.khrd.co.kr/>
- [9] [www.docdocdoc.co.kr](http://www.docdocdoc.co.kr)