**Research Article**

# DEVELOPMENT OF METAVERSE LEARNING ECOSYSTEM TO PROMOTE SELF-DIRECTED LEARNING OF UNIVERSITY STUDENTS

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## Abstract

The purposes of this research were 1) to develop the efficiency of metaverse learning ecosystem to promote self-directed learning of university students, 2) to study students' learning achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students, and 3) to assess the satisfaction of the development of metaverse learning ecosystem to promote self-directed learning of university students. The sample used in the research was 30 students who enrolled in the course "355230: Learning Environment Design" in the 2nd semester, academic year 2023. They were junior students from the Department of Educational Technology and Communication, Faculty of Education, Naresuan University. The research tools consisted of 1) a virtual learning ecosystem, 2) an e-learning achievement test, and 3) a self-directed learning satisfaction assessment form. The data analysis was presented by the average standard deviation and the Dependent T-test. The research results found that:

1. Development of the efficiency of metaverse learning ecosystem to promote self-directed learning of university students had the efficiency E1/E2 equals to 75.50/78.67, according to the 75/75 criteria.

2. Studying students' learning achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students was statistically significant at the .05 level.

3. Students who learned through the development of metaverse learning ecosystem to promote self-directed learning of university students were satisfied at the very high level. There were 4 self-directed learning outcomes: 1) Smart Practice Skills, 2) Smart Creator Skills, 3) Virtual Instructor Skills, and 4) Smart Approach Skills.

**Keywords:** Metaverse Learning Ecosystem, Self-Directed Learning, Development of Metaverse

## Introduction

Organizing a digital literacy environment "Digital Learning Ecosystem" demonstrates that the advancement of VR and AR technology with the Metaverse learning ecosystem is a new era of the Internet to create a virtual digital environment with a virtual learning ecosystem to promote self-directed learning, where users play as characters in which there is an intermediary to control a virtual world, called Second Life. Metaverse is therefore parallel to the real world or in some cases overlapping with the real world. Creators and players design a virtual world game that merges with the real world with AR technology, which is not a video game, but a virtual environment without defined missions to complete and advance through levels. As with any game, this means that players are free to do their own thing and build relationships with others the way you want as well as having a special intimate relationship which is no different from life in the real world. It can be said that Metaverse is more like immersing yourself on the Internet than just watching from your phone or computer screen (Hongjanya, 2021).

Nowadays, a virtual learning ecosystem promoting self-directed learning with Metaverse and combining the word Meta and Verse which means "Creative Universe" is a social network integrating virtual world technology with interesting and engaging applications that creates an environment of the real world and technology together. For users to interact and do activities together on various online media through an avatar on the behalf of doing different activities together, they will feel more alive than using other social media. At present, in the form of 3D graphics, education in the virtual world has already crossed learning borders without limits (Na Songkhla, 2022).

## Literature Review

Digital learning management in digital learning ecosystem through Metaverse knowledge is a learning environment for learners to develop digital literacy skills and a learning framework covering both formal and non-formal education. Therefore, the environment is arranged to suit the future world "21st CLEO" (21st Century Learning Ecosystem Opportunities). Digital environment and the way to understand the learning ecosystem are not necessary to understand the whole system as if looking at the environment through the future world. However, it can choose to focus on any point. This project has studied the components of the learning ecosystem which influenced the way of learning in the digital world in the 21st century. This can help students face new technologies for future work; including navigable pointless learning support and students' encouragement preparing for the future career paths with efficiency, without any obstacles, and with purpose. Skill-learning where technology meets work-learning style and ethics has integrated the knowledge in the digital world with transparency as learners can shape their own learning ecosystem under various pressures in learning ecosystem (Sannok et al., 2019).

**Students' Experience with Digital Learning in Response to Self-directed Learning**

Qualification Standard Framework, Faculty of Education, Naresuan University, encourages students and teachers to have morality and ethics by: 1) providing knowledge and understanding in the concept of morality, ethics, and professional ethics of teachers, 2) making them realize the importance of living and teaching profession according to morality, ethics, and professional ethics, and 3) teaching them to be able to analyze, synthesize, evaluate, and manage moral problems. Ethics and professional ethics of teachers use appropriate discretion and have behaviors on morality and ethics which are good examples. For instance; 1) providing knowledge and understanding of basic subjects in Humanities, Social Sciences, Science-mathematics, Interdisciplinary Subjects, and Thai language and foreign languages. 2) Providing knowledge and understanding of concepts, theories, and principles related to learners' development and learning or teaching as well as learning management or research and practices. Furthermore, rules and regulations related to education also change according to the situation. In addition, 3) having deep and systematic knowledge and understanding of concepts, theories, and principles as well as advancement in teaching disciplines. 4) Realizing the value of concepts, theories, and principles related to the development and learning of learners as well as teaching, research and customs, and rules and regulations related to education. 5) Realizing the value of the relevant concepts, theories, and principles in teaching disciplines for teaching profession. 6) Ability to integrate knowledge in various disciplines to be used in life and teaching profession effectively. 7) Ability to analyze, synthesize, evaluate, and apply knowledge to concepts, theories, and principles related to the development and learning of learners. Teaching and learning management as well as research and laws related to education are used in teaching and learning development of the learners. Problem solving and knowledge extension considering customs, rules, and regulations also change according to the situation. In addition, Qualification Standard Framework includes: 1) Have knowledge and understanding of principles and fact-finding processes; understanding and assessment Information from a variety of sources, 2) Realize the value of using an intellectual way of life and occupation, 3) Be able to analyze data to solve social, cultural, natural, and environmental problems as well as be able to adjust and suggest ways to solve problems in living life creatively considering theoretical knowledge practical experience and impact of decision-making, and 4) Able to use skills and understanding about the teaching profession and science-teaching disciplines and reflective thinking to solve problems in self-development and learning and teaching management as well as learning appropriately and effective (Faculty of Education, 2022).

**Digital Literacy Ecosystem and Self-directed Learning Students**

Nowadays, information technology is a virtual learning ecosystem to promote self-directed learning of higher education students as a whole organization has different ways of categorizing learning ecosystems. Designing learning styles and environments to facilitate continuous learning should consist of 3 forms: 1) Formal learning is a learning in the classroom, learning through e-learning, or from various learning media with specific topics and specific objectives. Learners should be given autonomy and participation in their own best learning choices. The environment should be varied, interesting, and not monotonous. 2) Learning through interaction

or exchanging ideas (Social Learning). Topics may come from the interests of the group itself. There is an opportunity to have a network of like-minded people come to talk and exchange ideas (Networking), which helps create positive feelings for what has been learned and also learned from outsiders as well. 3) Promoting the development of ideas (Learning Reinforcement) to facilitate the use of what is realized from learning (Insights) to benefit or think further and build a positive attitude towards continuous learning. Currently, there are many technologies that can help in this area (Phansri et al., 2023).

### Metaverse: Digital

Evolving technologies and pandemics have changed the way we teach. Technology has become the backbone of digital literacy education. Metaverse has the potential to drive the transformation of education to distance training. The experience of digital literacy empowers learners to develop their potential.

Metaverse Training has become abruptly trending since Mark Zuckerberg changed Facebook to Meta. Besides the enthusiasm that it has created, it has also gathered people's attention in its capability to provide the impression of the digital world's future. The term Metaverse was invented by Neal Stephenson in his sci-fi novel named Snow Crash. The novel tells the story of the interaction of the realistic avatars living in Virtual Reality (VR) and the authentic 3D buildings (E-learning Industry, 2023).

With such importance, it can be seen that the future of learning digital skills has developed a virtual learning ecosystem to promote self-directed learning of higher education students. It is significant to develop the quality of education and is also important for the new generation of learners or digital natives to learn by themselves according to the changes in the learning society and the way of life for self-improvement. This meets the intent of the National Education Act (NEA).

## Objectives

1. To develop the efficiency of metaverse learning ecosystem to promote self-directed learning of university students.

2. To study students' learning achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students.

3. To assess the satisfaction of the development of metaverse learning ecosystem to promote self-directed learning of university students.

## Research Scope

This research is focused on studying the development of metaverse learning ecosystem to promote self-directed learning of university students using experimental topics.

### Sample Group

The sample used in the research was 30 students who enrolled in the course "355230: Learning Environment Design" in the 2nd semester, academic year 2023. They were junior students from the Department

of Educational Technology and Communication, Faculty of Education, Naresuan University. They were selected using purposive sampling techniques.

**Research Variables**

1. Independent Variable: the independent variable was online lessons with development of metaverse learning ecosystem to promote self-directed learning of university students.

2. Dependent Variables including:

2.1 Students' academic achievement after studying of the online lessons with development of metaverse learning ecosystem to promote self-directed learning of university students. Efficiency meets the 75/75 criterion.

2.2 Students' satisfaction towards the online lessons with development of metaverse learning ecosystem to promote self-directed learning of university students.

**Content Scope**

The content used in this research consisted of five units:

Unit 1: Metaverse

Unit 2: Creating new identity in the Metaverse

Unit 3: Getting to know the virtual world economy

Unit 4: Network Theory

Unit 5: Learning the Metaverse World

**Research Instruments and Data Collection Methods**

Virtual Learning Ecosystem: development of metaverse learning ecosystem to promote self-directed learning of university students.

1. Online lessons with metaverse learning ecosystem to promote self-directed learning of university students of 5 learning units as follows:

Unit 1: Metaverse

Unit 2: Creating new identity in the Metaverse

Unit 3: Getting to know the virtual world economy

Unit 4: Network Theory

Unit 5: Learning the Metaverse World

Learning the Metaverse World of the undergraduate students was done accordingly to the ADDIE Model considering 5 steps (Eoghan Quigley, 2022).
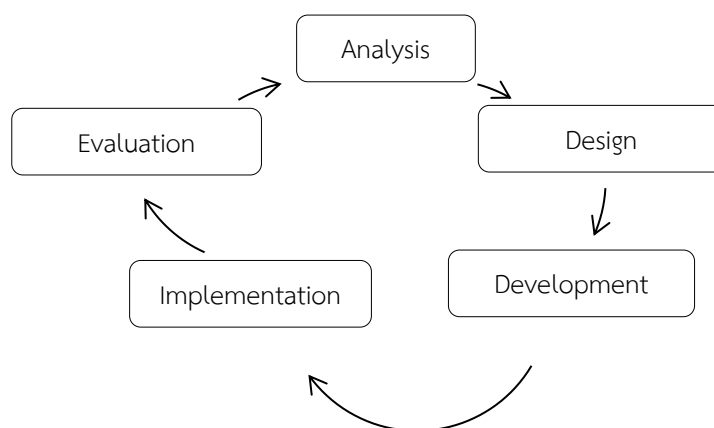
**Figure 1** Modular Teaching Module Design based on ADDIE Model

**Step 1 Analysis**

According to the ADDIE model, the first step in developing modular modules is analysis. Analysis is a basic stage of achieving another step as it aims to identify the teaching topics, learning objectives, subject-content delivery, and suitability of target audience. Therefore, it is crucial to examine and identify students' prior knowledge skills as this helps in teaching pedagogical planning. In the context of the course "355230, Learning Environment Management," the analysis process that needs to be done involves four aspects:

1) Analyze the skills of students

2) Analyze the standard content of the applied topics integrated Metaverse

3) Analyze the concepts for the development

4) Analyze the standard performance of the applied topics integrated in Metaverse

**Step 2 Design**

Design is the second step after the analysis process step. The purpose of this second step is to develop an appropriate instructional method to achieve the objectives of the course "355230, Learning Environment Management". Planning and deciding on the appropriate design shows that metaverse learning ecosystem promoting self-directed learning of university students of pedagogical approach is essential as the formulation of the curriculum covers not only the content of the curriculum, the topics included in each subject, and the teaching materials, but also teaching and learning strategies.

**Table 1** Electronic design topic adaptation: Metaverse applied topic

| Content | Metaverse Applied Topic | Learnings Outcome |
| --- | --- | --- |
| Unit 1: Metaverse | Character Scenes: Metaverse AR Platform | Knowledge |
| Unit 2: Creating new identity in the Metaverse | Information Technology in Digital Era | Idea |
| Unit 3: Getting to know the virtual world economy | The Metaverse promises an era in skills | Skill |
| Unit 4: Network Theory | Online Digital Google Classroom | Evaluation |
| Unit 5: Learning the Metaverse World | Mobile Communication, Digital Population Perspective | Competency |

Many researchers explained the development of metaverse learning ecosystem to promote self-directed learning of university students by developing the lessons and tests to use. It was found that the students had a competency (Jing Li and Chi-Hui Wu, 2023). There are 4 self-directed learning outcomes: 1) Smart Practice Skills (Used), 2) Smart Creator Skills (Used), 3) Virtual Instructor Skills (Used), and 4) Smart Approach Skills (Used).

**Step 3 Development**

This step leads to the details in the development of modular learning modules of the course "355230, Learning Environment Management" (Khammani, 2008). Therefore, this development process should be clear in terms of:

1. Topic for a combination of selected standard content Google Classroom

2. Problem statement that need to be resolved

3. Learning objectives through the modular learning phase

4. Situation and task design project

5. Content required to complete the assignment

6. Proposed learning process to achieve objectives

**Step 4 Implementation**

The implementation step refers to the act of using modular teaching modules for the course "355230, Learning Environment Management" in the classroom. Development of Metaverse learning ecosystem to promote self-directed learning of university students was implemented with a sample of 30 students from the Department of Educational Technology and Communication, Faculty of Education, Naresuan University in the 2nd semester, academic year 2023.

A pre-test and post-test were administered to assess students' academic achievement before and after the implementation of the lesson.

After the post-test, students completed a satisfaction assessment questionnaire to express their satisfaction level towards the lessons.

**Step 5 Evaluation**

1. Students' academic achievement before and after implementing the development of Metaverse learning ecosystem to promote self-directed learning of university students.

2. The results from assessing the students' satisfaction towards online lessons with development of Metaverse learning ecosystem to promote self-directed learning of university students.

3. The online lessons with development of Metaverse learning ecosystem to promote self-directed learning of university students on five topics.

The content used in this research consisted of five units:

Unit 1: Metaverse

Unit 2: Creating new identity in the Metaverse

Unit 3: Getting to know the virtual world economy

Unit 4: Network Theory

Unit 5: Learning the Metaverse World

## Data Analysis

Average standard deviation and Dependent T-test

**Development of Research Tools**

1. A learning activity plan on the management of a learning environment through the digital literacy ecosystem develops the metaverse learning ecosystem to promote self-directed learning of university students. Virtual Learning Ecosystem, Learning Environment Plan: Technologies enable multi-sensory interaction with virtual environments, digital objects, and people such as virtual reality (VR) and augmented reality (AR). As a result, the metaverse is a web of realistic social and networking environments on a continuous multi-user platform. It enables real-time user communication and dynamic interaction with digital artifacts with the principles of learning management. The online classroom of the virtual world consists of creating your own avatar, adding content link sent via Google Drive, share screen for a period of 8 weeks, 2 hours per week with the amount of 1 plan. By implementing improvements to check for a conformity index, 3 experts and a consistency index of 1.00, it was found to be practical.

2. Quality assessment questionnaire for virtual world learning ecosystem has guided by the experts stating the development of learning environment activities through the digital literacy ecosystem for the development of the metaverse learning ecosystem to promote self-directed learning of university students including the interviews with content experts on organizing a learning environment through the digital literacy ecosystem for the development of a virtual classroom, Metaverse; in analytical thinking and self-directed learning of higher education students.

3. Virtual world learning ecosystem media on learning environment management through developing the metaverse learning ecosystem to promote self-directed learning of university students shows a good level.

4. Learning achievement after study provides an environment with develop the metaverse learning ecosystem to promote self-directed learning of university students. Efficiency meets the 75/75 criterion at higher education. Implemented systematic design and development according to the ADDIE model principle has the quality checking from 3 experts. The overall quality of digital literacy media was at a very good level with a mean ($\overline{\mathbf{X}}$) equals to 4.65 and a standard deviation (SD) equals to 0.52. The mean was analyzed with the Expected Concordance Index (ECI) to show that digital literacy media on the provision of learning environments through digital literacy ecosystem for the development of virtual classrooms, Metaverse; has promoted the ability of critical thinking and self-directed learning of higher education students. The result of the analysis for the consistency index found that all items were ≥0.5 or more.

5. Digital Metaverse Ecosystem with multiple-choice questions, 4 options, each with an answer. The only correct one performs improvements according to the examination of the conformity index from 3 experts. It has the Index of Concordance (IOC) of the digital metaverse ecosystem scale. It was found that all items were ≥0.5 or higher and the difficulty (p) was between 0.4-0.7 and discrimination power (r) was between 0.2-0.8. The coefficient (KR-20) = 0.81, in which the criterion for interpretation was in the range of 0.71–1.00, i.e., the confidence of the entire questionnaire was .912, which was considered an acceptable confidence value.

6. Assessment form for teaching and learning media design affects the virtual world learning ecosystem with scoring criteria using a measure of achievement called Rubrics. The Rubrics for all 4 levels are divided into 4 aspects of the evaluation criteria which are 1) Smart Practice Skill, 2) Smart Creator Skill, 3) Virtual Instructor Skill, and 4) Smart Access Skill, with a total of 20 points. The consistency index found that all items were ≥0.5 or more.

7. Satisfaction questionnaire towards learning activities on learning environment management through the development of metaverse learning ecosystem to promote self-directed learning of university students contains 20 questions.

## Research Results

The research results on the development of metaverse learning ecosystem to promote self-directed learning of university students are as follows:

1. the results of the development of metaverse learning ecosystem to promote self-directed learning of university students has E1/E2 efficiency equals to 75.50/78.67, meeting the criteria of 75/75.

**Table 2** Development of the efficiency of metaverse learning ecosystem to promote self-directed learning of university students had the efficiency E1/E2 equals to 75.50/78.67, according to the 75/75 criteria

| Digital Metaverse Ecosystem 1) Use skills, 2) Smart Creator skills, 3) Virtual instructor skills, and 4) Smart Access skills | Efficiency | | |
|---|---|---|---|
| | E1 | E2 | E.I. |
| 3 people | 77.50 | 95.00 | 0.7778 |
| 9 people | 78.33 | 95.83 | 0.8077 |
| 30 people | 75.50 | 78.67 | 0.1293 |

From Table 2, developing the efficiency of the metaverse learning ecosystem to promote self-directed learning of university students: 1) Smart Practice Skills, 2) Smart Creator Skills, 3) Virtual Instructor Skills, and 4) Smart Access Skills has E1/E2 efficiency (3 people) at 77.50/95.00 and post-learning E.I. was 77.78. E1/E2 efficiency (9 people) was 78.33/95.83 and post-learning E.I was 80.77, test E1/E2 efficiency (30 students) was 75.50/78.67 and the post-learning E.I was 12.93.

2. Achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students were statistically significant higher in learning achievement of after learning than before learning at the .05 level.

**Table 3** Statistics

Paired Samples Statistics

| | | Mean | N | Std. Deviation |
|---|---|---|---|---|
| Pair 1 | Pre-test | 30.20 | 30 | 6.47 |
| | Posttest | 56.50 | 30 | 3.17 |

Paired Samples Test

| | | Paired Differences | | | t | df | Sig.(1-tailed) |
|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | | | |
| Pair 1 | Posttest - Pretest | 26.30 | 5.88 | 1.07 | 24.5028 | 29 | 0.000 |

From Table 3, it was found that the test of students learning by organizing the development of metaverse learning ecosystem to promote self-directed learning of university students first study and after study had an average of 30.20 points and 56.50 points, respectively. It is higher than before the study which was statistically significant at the .05 level.

3. Students who learned through the development of metaverse learning ecosystem to promote self-directed learning of university students were satisfied at the highest level. There were 4 self-directed

learning outcomes: 1) Smart Practice Skills, 2) Smart Creator Skills, 3) Virtual Instructor Skills, and 4) Smart Approach Skills.

**Table 4** Satisfaction results of students contain 4 self-directed learning outcomes

| Question | $\overline{X}$ | SD | Interpretation |
|---|---|---|---|
| **Preparation before studying; smart practical skills (Used)** | | | |
| 1. Hardware (Computer, Laptop, Smartphone) | 3.53 | 0.73 | Very High Level |
| 2. Internet Service Learning | 3.40 | 0.62 | Very High Level |
| 3. Teaching Web | 3.73 | 0.64 | Very High Level |
| 4. Application | 3.57 | 0.50 | Very High Level |
| 5. Social Media online, Cloud Computing | 3.53 | 0.51 | Very High Level |
| Total | 3.55 | 0.60 | Highest level |
| **Learning activities: (Smart Creator)** | | | |
| 1. Create Avatar | 3.63 | 0.56 | Very High Level |
| 2. Add Content Link | 3.60 | 0.56 | Very High Level |
| 3. Google Drive | 3.70 | 0.53 | Very High Level |
| 4. Share Screen | 3.37 | 0.49 | Medium Level |
| 5. Cloud | 3.63 | 0.49 | Very High Level |
| Total | 3.58 | 0.52 | Very High Level |
| **Learning media: (Virtual instructor)** | | | |
| 1. Facebook | 3.67 | 0.48 | Very High Level |
| 2. Canva | 3.53 | 0.63 | Very High Level |
| 3. YouTube | 3.67 | 0.55 | Very High Level |
| 4. Presentation | 3.67 | 0.48 | Very High Level |
| 5. Smart Device, Cloud | 3.77 | 0.43 | Very High Level |
| Total | 3.66 | 0.51 | Very High Level |
| **Learning content: (Smart Access)** | | | |
| 1. Preliminary online tool practice test | 3.67 | 0.48 | Very High Level |
| 2. Selection of online tools: Metaverse | 3.47 | 0.51 | Very High Level |
| 3. Organizing a virtual world learning ecosystem | 3.57 | 0.50 | Very High Level |
| 4. Techniques for using images and sounds | 3.70 | 0.47 | Very High Level |
| 5. Virtual digital learning | 3.63 | 0.49 | Very High Level |
| Total | 3.60 | 0.49 | Very High Level |
| **Grand total: Metaverse** | **3.61** | **0.19** | **Very High Level** |

From Table 4, the digital learning outcomes of students learning through the management of the knowledge ecosystem digital environment had developed the metaverse learning ecosystem to promote

self-directed learning of university students. Overall, it equals to ($\overline{\mathbf{X}}$= 3.61, SD = 0.19) at a very high level. There were 4 self-directed learning outcomes: 1) Smart Practice Skills equals to ($\overline{\mathbf{X}}$ = 3.55, SD = 0.60) at a very high level, 2) Smart Creator skills equals to ($\overline{\mathbf{X}}$ = 3.58, SD = 0.52) is at a very high level, 3) Virtual instructor skill equals to ($\overline{\mathbf{X}}$ = 3.66, SD = 0.51) was at a very high level, and 4) Smart Access skill was ($\overline{\mathbf{X}}$ = 3.60, SD = 0.49) located in a very high level.

## Summary and Discussions

**The research results found that:**

1. Development of the efficiency of metaverse learning ecosystem to promote self-directed learning of university students had the efficiency E1/E2 equals to 75.50/78.67, according to the 75/75 criteria.

2. Studying students' learning achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students was statistically significant at the .05 level.

3. Students who learned through the development of metaverse learning ecosystem to promote self-directed learning of university students were satisfied at the very high level. There were 4 self-directed learning outcomes: 1) Smart Practice Skills, 2) Smart Creator Skills, 3) Virtual Instructor Skills, and 4) Smart Approach Skills.

The findings indicate to develop of metaverse learning ecosystem to promote self-directed learning of university students found that the development of efficiency of metaverse learning ecosystem to promote self-directed learning of university students had the efficiency E1/E2 equals to 75.50/78.67, according to the 75/75 criteria. Moreover, studying students' learning achievements through the development of metaverse learning ecosystem to promote self-directed learning of university students was also statistically significant at the .05 level. Students learning through the digital literacy ecosystem environment for developing a virtual world classroom, Metaverse; had promoted the ability to think critically and self-directed learning of higher education students. Students learning through development of metaverse learning ecosystem to promote self-directed learning of university students were satisfied at a very high level. There were 4 self-directed learning outcomes: 1) Smart Practice Skills, 2) Smart Creator Skills, 3) Virtual Instructor Skills, and 4) Smart Approach Skills. Students were satisfied at a very high level. Different fields of education use the Metaverse, for instance; medical, nursing, science education, healthcare education, and manufacturing training. It is assumed that the education using the metaverse will vary from conventional education based on VR or AR by the characteristics of the metaverse (Hwang & Chien, 2022), (Alsakhnini, 2022). The virtual learning ecosystem plays a significant role in teaching and learning environments. Metaverse is one of the learning communities that plays a role in the cyber technology society. Therefore, metaverse is a social communication framework that integrates learning through the social communication paradigm and enhances the learner's experience of immersing themselves in a virtual technological society that interacts with the learning environment ecosystem effectively (Na Songkhla, 2022).

## Recommendations

### 1. Suggestions for applying the research results.

1.1   Learning ecosystem in the virtual world (Digital Metaverse Ecosystem) organizes an online learning environment with effective accessibility skills.

1.2   Metaverse, as a social communication technology, enhances the ability to think critically and leads to self-directed learning for higher education students.

1.3   Self-directed learning system enables students to integrate four skills: Use, Smart Creator, Virtual Instructor, and Smart Access. It should be studied in the future more efficiently.

### 2. Suggestions for further research

2.1   Advancing skills in artificial intelligence technology in ChatGPT and using Metaverse virtual world technology should be studied in the future.

2.2   Cyber technology skills should be integrated with the skills using visual and audio technology to use as the learning tools in the future.

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