



RESEARCH ARTICLE

An Innovative Online Learning Program for the Enhancement of Communication Skills Among the Elderly in Urban Thailand

Roselyn Debhavalaya^{1*}, Torsangrasmee Teetakaew²¹Ph.D. Student. Collage of Innovation and Industrial Management. King Mongkut's Institute of Technology of Ladkrabang²Assistant Professor. Collage of Innovation and Industrial Management. King Mongkut's Institute of Technology of Ladkrabang

ARTICLE INFO	ABSTRACT
Received: Dec 24, 2024 Accepted: Feb 8, 2025	The research of "An Innovative Online Learning Platform for the Enhancement of Communication Skills among the Elderly in Urban Bangkok" aims to 1) study an innovative university online learning platform and 2) to improve and promote the innovative platform in online learning and digital communication skills for the elderly in and around Bangkok, Thailand. Research methods include quantitative and qualitative research. Concepts and theories are the Active Ageing Approach, Lifelong Learning and Online Learning. The target population is 30 seniors who have registered for the Professional Communication and Presentation course via the KMITL e-learning platform, which is called KLIX: KMITL Learning Intelligence X, and also 10 key informants who are experts in online learning course production and training for elderly. Research tools are an online learning course on Professional Communication and Presentation for the Elderly, prepared for the elderly to sample and give feedback via questionnaire and in-depth interview points. The results of this research provide a better understanding of developing the innovative KLIX platform prototype at King Mongkut's Institute of Technology, Ladkrabang, and its capability to upskill the active elderly urban Thai population. Its lesson relevance shows that the new module topics were created based on the current demand and online behavior of the elderly. Three new modules are aimed to encourage more active ageing approach to help the elderly improve their digital skills and participation pillar in Thai society. The new modules should create inspiration to integrate and upskill the elderly community in society. The research method applied here can be beneficial as a model used to gauge the intention to use the KLIX prototype among the elderly in Thailand.
Keywords Elderly Online learning platform Active ageing Lifelong learning	
*Corresponding Author: Rosely@gmail.com	

INTRODUCTION

The population of older Thai people has grown more rapidly than ever. A half-century ago, Thailand had an older population of fewer than two million. By 2021, the number had risen to 12.5 million, or 19 % of the total population. In 2022, Thailand had become a completely aged society with 20% of the population aged 60 years and above (Office of the National Economic and Social Development Council, 2023). By 2040, the elderly community is projected to exceed one third of the entire populus, with the rate increasing by an average of 4% per year.

The older and most fragile demographic of adults have been most afflicted by the emergence of COVID-19 in 2020. The virus has since continued to undermined nearly every part of Thai society from the economy to the health and well-being of the population. In 2021, COVID-19 infected 182,950 older people, accounting for 11% of all cases in Thailand that year. Simultaneously, 14,597 older people died from the virus, accounting for 70% of all COVID-19 deaths in the same year (Foundation of Thai Gerontology Research and Development institute, 2021). Whether or not they were infected,

life became miserable for millions of older Thais who could no longer earn income or even socialize outside the home. The elder folk were most isolated from society and even government assistance programs. In many cases, the elders may have had to care for dependent grandchildren whose schools shut down. Other elderly had also faced challenges in using the Internet and modern communication technologies because of their lack of know-how.

All the while, the lifespan of the Thai elderly continues to increase alongside modern medicine and related technologies, with the United Nations *Revision of World Population Prospects* (2023) reporting that lifespans climbed steadily by 0.24% on average over the past four years. It will remain at this rate for years ahead as the current average life expectancy is 78 years, and the number is projected to rise to 80 by 2040 ([United Nations, 2023](#)).

With Thailand's overall population rapidly growing older, the government and related industries resumed talks in late 2023 about raising the statutory retirement age from 60 to 65 years in order to both support the "aged society" and tackle the country's ongoing labor shortage ([Labor Ministry, 2023](#)). As of 2019, the [World Health Organization](#) calculated Thailand's Healthy Life Expectancy (HALE) at birth to be an average of 68 years for both sexes. The number had risen steadily over the past 19 years with the average of 62 years in 2000. This indicates that many older Thais can be expected to spend more years living in "full health," while being less prone to disease or injuries at this point. Accordingly, the elderly population remains capable of working and even require jobs to offset their mounting social and economic burdens.

Most jobs available to older workers, such as watchmen and caretakers, tend to require lesser specialized skills than younger workers. For the elderly workers, these paying jobs may provide their only source of income if they do not receive regular government assistance or family support. This difficult situation is likely to become even more prevalent as Thailand matures further into a "super-aged society" in 2029 ([Department of Older Persons, 2023](#)).

With the government pushing across the Thailand 4.0 economic model to propel the country toward digitization and an officially developed country status, it is crucial to offer more flexibility and technological literacy to all demographics. It is especially critical for the expanding elderly group of which only 1% currently possess the necessary skills to survive in a modern, ICT-oriented workplace ([Thammasat University, 2019](#)). A solution to the current lack of digital literacy is to research and develop comprehensive tools for the upskilling of the older workforce.

During the start of Covid-19 in 2020, just as lockdowns were enforced around Thailand, education institutions around the country shut down their campuses and migrated online. Educators had to hastily convert their face-to-face courses to an online format integrating various digital platforms into their teaching practices as everyone "worked from home" ([Conklin et al., 2021](#)). This period led to the advent of the "new normal" where government-imposed lockdowns and separation drove society to adjust to the new way of life that encouraged remote work as well as integration of distance communication technologies in all areas. For these reasons, we are drawn to research and develop this innovative lifelong learning platform at King Mongkut's Institute of Technology, Ladkrabang (KMITL), and assess its acceptance for the purpose of upskilling the active elderly urban Thai population.

The KMITL Learning Intelligence X (KLIX) project was conceived in the spring of 2020 to address the challenge of distance learning for students unable to connect with their professors during the coronavirus lockdown. Education innovators at KMITL initiated the KLIX masterclass pilot which was inspired by the staggering success of Masterclass, a US online education subscription platform offering pre-recorded tutorials and lectures from experts in various industries. Based on the innovative trends, educators produced and published six experimental courses: The Disruptor, Modern Entrepreneur, Digital Media Production, Professional Communication and Presentation (both Thai and English versions) and Charm School. The courses were launched on the 60th anniversary of KMITL through the EDx online learning platform, a massive open online course (MOOC) tool developed in the United States in 2012 that offers on its webpage an extensive catalog

of online courses, programs and awards certifications from a multitude of universities and institutions.

KMITL used the second service offered by EDx called EDx Open, a design platform that allows institutions to independently create and publish its own educational programs on separate webpages. KLIX graduated from its partnership with EDx Open in 2022 and began using WordPress, a content management system (CMS) that evolved from its advent as a blogging website in 2003 into a program that supports publishing web content ranging from traditional websites to mailing lists and Internet forums, media galleries, membership sites, learning management systems and online stores. As KLIX continued to evolve, more personalized space was needed to accommodate the growing volume of classes, personalized interactions with educators and more flexible financial transactions.

Financial assistance from Thailand's Ministry of Higher Education, Science, Research and Innovation during the Covid crisis, helped the KMITL team gradually expand its catalogue of prerequisite courses on the KLIX platform to aid both students and professors in preventing an education vacuum. From the initial six courses, there are currently 119 courses accessible online, with the number constantly fluctuating. KLIX developers plan to ultimately publish all prerequisite classes online while simultaneously adding more elective subjects depending on the readiness of associated faculties.

While new social norms evolved from various extents of Covid-19 regulations, online learning has amassed increasing attention. Instruction is progressively moving from traditional tactile conventions, such as books and interpersonal lectures to more computer-based media such as narrated animation, instructional video and educational games and simulation as seen by the growth of global online learning platforms. The online platforms allow for many innovative approaches to facilitate learning while also saving both time and expenses generated from lengthy commutes among other costs. But what is needed now is more focus and effective tools to develop skillsets of the elderly.

MATERIALS AND METHODS

This research is conducted using qualitative methods. To delve deep into the set objectives, the researcher has explored relevant papers, reviewed literature, and developed a conceptual framework of theories and hypotheses to investigate. The scope of the study involves the following.

Population and Sample

The target sample population of this thesis is the following:

- 1) Elderly Persons: 30 people, aged 60 years and older, who are Internet-literate and reside in and around the urban areas of Ladkrabang and Minburi. The sample groups were selected based on a purposive cluster sampling method for the urban elderly Thais. It is a group experimenting with the professional communication and presentation online learning course.
- 2) Key Informant: 10 persons. The key informants are experts with experience in creating online learning platforms and materials and are experienced in providing training for the elderly.

Researched Technology

Professional Communication and Presentation online course from KMITL Learning Intelligence X, An Online learning Platform run by King Mongkut Institute of Technology, Ladkrabang, and developed by Roselya Debhavalya.

This research is conducted following six planned procedures.

- 1) This research began in 2023. The researcher followed these steps as indicated:

Step 1: Primary background research and research questions

Step 2: The identification of conceptual framework

Step 3: Testing and verification of existing KLIX online-learning platform

Step 4: Research conduction and data collection

Step 5: Data validation and data analysis

Step 6: Report of learning, conclusion, development of 3 new modules to be produced in the professional communication course for the elderly, submission of research.

2) The researcher finished all six steps of research and completed this study by June 2024.

RESULTS

After the production of the original six pilot classes, from spring 2020 onward, KMITL Learning Intelligence X (KLIX) innovators continued amassing online courses centered around general prerequisites while considering elective classes. At the same time, creating each online course has required a meticulous eight-step procedure. The first step involves pitching a proposal that details the desired topic, teaching methods, course specifications, a storyboard, a theme, a reference case, and an action plan. In the second step, the online learning faculty reviews the proposal. Third, the online learning board deliberates and selects the ideas. Then, in the fourth stage, the production team may begin filming, editing, and laying out the online course. The university online learning team then scrutinizes the completed course in the fifth step before it gets uploaded into WordPress (CMS) for student access in the sixth step. KMITL then offers a test run of the new course in the seventh step to evaluate the satisfactory learning outcome (LO) before the class gets final approval in the last step.

The general format of each online class consists of 7 to 15 videos, with time frames ranging from 15 to 60 minutes. Each lecturer designs their respective courses using a combination of on-camera narration and instruction as well as visuals, including slides, graphics, and even animated narration. Interspersed between video clips are quizzes and summary questions meant to test the students' comprehension of the subject, and gauge the course's learning outcome (LO). More than 100 online classes currently listed on <https://klix.kmitl.ac.th/> are video-streamed and stored in the local university server, of which size exceeds 14 terabytes.

On the KLIX website, courses are currently organized into nine categories in the pulldown menu: Lifelong/Elderly, College of Innovation and Industrial Management, Introduction, Full Course, Legend, Happy Life, Future Skill X KMITL, Thailand Plus Package, and Workshop. The Lifelong/Elderly category lists classes tailored for seniors, while the College of Innovation and Industrial Management (CIIM) tab includes courses that focus on the industrial business angle. The introduction tab offers condensed versions of various classes free of charge. Instead of 14 units, there are only 6. In contrast, the Full Course page offers these courses in 14 units. The Legend tab lists courses taught by renowned experts in their respective fields, while Happy Life topics include classes about lifestyle and relationship dynamics. Future Skill X KMITL offers courses on computer programming and innovative tools for business. At the same time, the Thailand Plus Package provides courses for skills development in numerous manufacturing areas ranging from SPSS for Windows to Cooking with Science Fermented Foods Series and 3D Animation. The workshop currently lists Feng Shui. As the course volume continues to increase, the organization and design of the webpage may also be modified.

Professional Communication and Presentation Course for the Elderly

Professional Communication and Presentation breaks down the components of polished communication for on-screen and behind-the-scenes as well as in the workplace and everyday life. This online course delves into unique and critical topics such as interpersonal dynamics, navigating digital communication, confident public speaking, on-camera presenting and understanding nonverbal communication. Familiarizing with these subjects will not only keep the elderly well

connected in their respective communities but will also offer the tools to support alternative methods for their well-being and livelihoods.

This course comprises of 14 study units with episodes totaling 10.48 hours. Each module teaches skills for communicating professionally in both Thai and English through the lens of professional television broadcasters. Other topics include methods of improving presentation both on-screen and off-screen by understanding the mechanics of tone of voice, nonverbal cues, and clear speech. The course lessons are arranged as follows.

Lesson 1: Introduction to Professional Communication and Presentation

This module discusses the overview of the subject, practicing the use of various presenting skills in everyday situations.

Lesson 2: Navigating Interpersonal Dynamics Professional communication with the right personality

Lesson 3: Professional corporate communication

Listening, thinking, analyzing, speaking, reading, writing, media, aids, communication

Lesson 4: Digital Communication

Media Literacy Check before sharing. Check Reference first.

Lesson 5: Communication techniques, Preparing for professional communication

Lesson 6: Standups & On-Camera Presenting

This topic addresses techniques to navigate one-way communication, and present naturally as well as professionally.

Lesson 7: Resonance & Inflection

This episode explains why our voices sound the way they do. The instructor provides know-how on enriching the voice for more dynamic and compelling speech.

Lesson 8: Nonverbal Communication

This episode explains another form of communication that often goes under the radar because of its subtle nature. After familiarizing with nonverbal communication, this lesson instructs students on how to better decode human behavior and communication through observation.

Lesson 9: Interpersonal Communication

From this episode, students will better understand mechanisms involved in human interaction and behaviors for more effective communication, while also be given tools to better decode human behavior and communication from various social settings.

Lesson 10: Articulation

This episode explains the mechanics of English speech and how clear words are formed. This lesson provides tools to help polish English conversation to become clearer, more professional and effective.

Lesson 11: Public Speaking and Experiences form public speakers

Lesson 12: Conclusion to Professional Communication and Presentation

Regarding the teaching style of this course, the instructors have more than 20 years of experience in professional communication working as media hosts and announcers while also teaching public speaking. Each lesson comes with a short lecture with exercises for students to practice their communication skills. Each video episode runs between 10 to 15 minutes. Learners are required to complete the assessment in the simplest multiple-choice format. To summarize the learning and review the understanding of the lesson, learners must listen to all of the modules before completing the assessment after each episode in order to receive a certificate of honor in this training course.

The trainers have designed workshops to organize activities for the elderly. The elderly must review the presentations and make their own presentations individually or in groups. The evaluators will conduct individual assessments to ensure that participants gain knowledge and a proper understanding of the lessons in order to be able to apply them on their own.)Torsangrasmee, 2021).

In an experiment with 30 older adults who studied this subject, it was found that the elderly were interested in and excited about the topic. The 30 elderly people in the sample group had never learned online by themselves first. Older people over 70, 10 of whom were in the total sample, also needed someone to help them access the lessons, click on the videos and continue the assessment by this group of seniors, suggesting that group learning is more fun and convenient.

In terms of the content used in the presentation and the techniques of the teaching materials on the topic of pronunciation, speech, and language, it was found that the speaker is very important in making the elderly better understand the lessons, feel connected and enjoy the experience. It is also desired for the lecturers of this course to be knowledgeable and competent in the fields of English communication and production. In addition, the speaker should use soft and strong voice tones and inflections without fast tempos. The lecturer's conversational style and pace should leave rhythm for the elderly to experiment and practice according to their comfortable speed. However, the elderly still felt that after completing the online course, they would be happier and have more fun practicing in person with the instructor and practicing in a group.

In terms of topics, the elderly are interested in and want to practice using online media or social media in the form of making online video clips and holding meetings to look credible and engaging. They are also interested in learning to be online merchants, which is a topic that the elderly believe that if developed, it will be of great benefit both in the development of their communication skills and the application of continuing to extend their careers and income.

Regarding the advantage of taking this online course, all 30 seniors gave their opinion that they felt valued because the country's higher educational institution is attentive as it continues to develop the curriculum. Skills development for the elderly is considered to be a visualization of the elderly potential to continue building and creating value for society. Having the energy, experience, and ability to communicate effectively will keep the next generation interested in their opinions and experiences as an opportunity to socialize, participate in family or social work, and build happiness by contributing to the community through online dialogue, media and trade.

DISCUSSION

According to the interviews of the 10 key informants, including five experts in the production of online teaching materials and five experts in the management of training for the elderly, it was found that the 10 key informants agreed that organizing online training for the elderly on topics related to professional communication is challenging and interesting because the elderly will begin to have age-specific communication limitations such as speaking, listening, and writing skills. Seniors who have never had work experience in professional communication, if allowed skills development, can also help other older people apply their life experiences to work in other roles, such as an organization mentor. Even the starting point of being a counselor and speaking with family members with age differences can help reduce the age gap.

However, from the trial of the informant with this online course, it was found that there are suggestions for adjusting the online course for the elderly as follows:

First, keep the content up to date with the world trends. In the digital era, with such communication media in the form of video clips and online speaking, it is necessary to instruct with both in terms of using technical tools and speaking skills to motivate listeners to effectively understand and apply tone, preparation, and communication. Conversations and speaking at a specific pace and rhythm can also help increase the comprehension of the elderly.

Second, graphic designs should be considered. Illustrations to suit the visional needs of older people through mobile phones, smartphones, and tablets must be of appropriate size. The speed and frequency of changing images must recognize a suitable pace for the elderly giving them enough time to read the information until the end.

Third, it should be considered that the online learning platform for older people should be made more accessible, especially for new groups of seniors who need to register. Learning should be made easier for the elderly. Access to the knowledge assessment system should be done in an uncomplicated manner so that older people can easily review the material on their own without need for assistance.

Fourth, further into the future, the application and the advancement of artificial intelligence (AI) technology will help analyze the knowledge gained from training of the elderly. This technology will process and guide the skills development of the elderly and extend it to other subjects to further develop appropriate skills.

The results obtained from the trial of the 30 sample of the elderly and the feedback from the 10 key informants led to the development of 3 new modules to be produced in the professional communication course for the elderly, as follows:

Table 1 Course outline for 3 new Module of Professional Communication and Presentation course for elderly

Episode	Topic	Main Content	Teaching Technique	Evaluation tool
1	Videoconferencing for the Elderly	Teaching simple methods to help the elderly be ready to speak and present, as well as understand and improve video conferencing skills like a professional.	-Prerecorded video tutorial of lecturer narrating slowly, and giving step by step demonstration. -Lecturer gives encouragement throughout lesson. -Audiovisual graphics using slides with larger text, less bright images and more demonstration. -Include a printable file of the lesson transcript for the elderly to review. -Summary at the end of lesson.	End of module simple quiz
2	Creating Podcasts for the Elderly	Teaching simple methods to help the elderly both use and share their own stories using Podcast.	-Prerecorded video tutorial of lecturer narrating slowly, and giving step by step demonstration. -Lecturer gives encouragement throughout lesson. -Audiovisual graphics using slides with larger text, less bright images and more clarity. -Include a printable file of the lesson	End of module simple quiz

			transcript for the elderly to review. -Summary at the end of lesson.	
3	Online Presenting and Marketing for the Elderly	Teaching simple methods to help the elderly speak and present themselves professionally for the purposes of enhancing their online projects.	-Prerecorded video tutorial of lecturer narrating slowly, and giving step by step demonstration. -Lecturer gives encouragement throughout lesson. -Audiovisual graphics using slides with larger text, less bright images and more demonstration. -Include a printable file of the lesson transcript for the elderly to review. -Summary at the end of lesson.	End of module simple quiz

Suggestion for further development of online learning course for elderly.

1. Lesson Presentation
 - a. Slower pacing and more simple narration by lecturer.
 - b. Clear step by step guided demonstrations.
 - c. Continuous encouragement and (prerecorded) interaction by lecturer.
2. Lesson Design
 - a. Larger and clearer fonts and captions with additional highlights and special effects when necessary.
 - b. Fewer excessive images and animations. More focus on guided demonstrations.
 - c. Shortening the lessons to maintain elderly attention.
 - d. Transcript handout offered at the end of the lesson for review.
3. Lesson Relevance
 - a. These new module topics were created based on the current demand and online behaviors of the elderly.
 - b. Three new modules are aimed to encourage more active ageing in Thai society.
 - c. The new modules were created to inspire the integration and upskilling of the elderly community in society.

The heart of the online learning course for the elderly should pave the way for them while acknowledging cognitive loads and design principle. Cognitive loads are intrinsic, germane, and extraneous based on the amount of mental effort. Intrinsic load is “the mental work imposed by the

complexity of the content in the lessons and is primarily determined by your instructional goals” (Clark et al., 2005). Germane load is “mental work imposed by instructional activities that benefit the instructional goal” (Clark et al., 2005). Extraneous load refers to “the mental work that is irrelevant to the learning goal and consequently wastes limited mental resources” (Clark et al, 2005). Together these form the construct of “cognitive load.”

E-learning theory is also composed of principles that can be integrated into instructional design. They demonstrate “how educational technology can be used and designed to promote effective learning” (Wang, 2012). The eleven principles of the model that can promote effective learning are:

- 1) Multimedia principle: Using two formats of audio, visual, and text instead of using one or three.
- 2) Modality principle: Explaining visual content with audio narration instead of on-screen text.
- 3) Coherence principle: Avoiding irrelevant videos and audio.
- 4) Contiguity principle: Aligning relevant information to corresponding pictures concurrently.
- 5) Segmenting principle: Managing complicated content by breaking a lesson into small parts.
- 6) Signaling principle: Offering signals for the narration, such as arrows, circles, and highlights.
- 7) Learner control principle: Allowing the learner to control their learning pace.
- 8) Personalization principle: Presenting words in a conversational and informal style.
- 9) Pre-training principle: Providing descriptions or explanations for key concepts in a lesson before the main procedure of that lesson.
- 10) Redundancy principle: Presenting visuals with audio or on-screen text but not both.
- 11) Expertise effect: Considering that design principles may have a different effect on learners with various amounts of prior knowledge (Clark & Mayer, 2016; Mayer, 2003; Mayer & Moreno, 2003; Mayer et al., 2015).

Together, these eleven principles form the construct of “design principles.” Overall, the ideas of cognitive load and design principles can be integrated to reduce extraneous cognitive load and manage germane and intrinsic loads by making it easier for the brain to process the amount of information needed to perform instructional tasks which finally help elderly learn effectively and happily.

REFERENCES

- Conklin, S. & Garrett Dikkers, A., 2021, Instructor social presence and connectedness in a quick shift from face-to-face to online instruction. *Online Learning*, 25(1), pp: 135-150.
- Clark, R.C., & Mayer, R.E., 2016, *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (4th ed.). John Wiley & Sons, Inc.
- Clark, R. C., Nguyen, F., & Sweller, J. ,2005, *Efficiency in learning: Evidence-based guidelines to manage cognitive load*. Pfeiffer.
- David, L. ,2015, *E-learning Theory* (Mayer, Sweller, Moreno). *Learning Theories*. <https://www.learning-theories.com/e-learning-theory-mayer-sweller-moreno.html>.
- Department of Elderly Affairs, Ministry of Social Development and Human Security, 2023, *Integrated plan to prepare for an ageing society*. Bangkok: Thailand
- Kartal, G.,2010, Does language matter in multimedia learning? Personalization principle revisited. *Journal of Educational Psychology*, 102(3), pp: 615.
- Kurt, A.A.,2011, Personalization principle in multimedia learning: Conversational versus formal style in written word. *TOJET: The Turkish Online Journal of Educational Technology*, 10(3), pp: 185-192.

- Foundation of Thai Gerontology Research and Development Institute (TGRI). ,2021, *The Situation of the Thai Older Persons, 2021, Nakhon Pathom: Institute for Population and Social Research, Mahidol University.*
- Gupta PK, 1988. Elements of Biotechnology. 1st edition. Rastogi Publications, Meerut, India. pp: 42-45.
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A.,2020, *The difference between emergency remote teaching and online learning.* Educause Review, 27, pp:1-12.
- Mackenzie, N. I., Eraut, M., and Jones, H. C.,1970, *Teaching and Learning: An Introduction to New Methods and Resources in Higher Education.* Paris: Unesco; International Association of Universities.
- Mayer, R. E.,1997, Multimedia learning: Are we asking the right questions? Educational Psychologist, 32(1), pp: 1-19.
- Mayer, R.,2003, Elements of a science of e-learning. Journal of Educational Computing Research, 29(3), pp: 297-313.
- Mayer, R.E., Moreno, R., & Sweller, J.,2015,. E-learning theory. <https://www.learning-theories.com/e-learning-theory-mayer-sweller-moreno.html>.
- Mayer, R. E., & Moreno, R.,2003,. Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist, 38(1), pp: 43-52.
- Moreno, R.,2006, Does the modality principle hold for different media? A test of the method-affects-learning hypothesis. Journal of Computer Assisted Learning, 22(3),pp: 149-158.
- Moreno, R., & Mayer, R.,2007, Interactive multimodal learning environments. Educational Psychology Review, 19(3), 309-326.
- Peterson, R. E.,1979, Lifelong Learning in America. San Francisco: Jossey-Bass.
- Roy Rillera Marzo, Praval Khanal, Sunil Shrestha, Devi Mohan, Phyo K. Myint, and Tin Tin 2023. *Determinants of active ageing and quality of life among older adults: systematic review.* Front Public Health.; 11: 1193789. Published online 2023 Jun 26. doi: 10.3389/fpubh.2023.1193789 PMID: PMC10330697 PMID: 37435519
- Sweller, J., Van Merriënboer, J. J. G., & Paas, F.,2019, Cognitive architecture and instructional design: 20 years later. Educational Psychology Review, 31(2), 261-292.
- T.Teetakaew. 2021.Course Materials for Professional Communication and Presentation courses. KMITL: Bangkok.
- United Nations Department of Economic and Social Affairs Population Division,2022, **World Population Prospects 2022.** <https://population.un.org/dataportal/>
- Wang, V. C.,2012,. Understanding and promoting learning theories. International Journal of Multidisciplinary Research and Modern Education, 8(2), pp:343-347.
- World Health Organization, 2002, *Active Ageing A Policy Framework.* [online] <https://extranet.who.int/agefriendlyworld/wp-content/uploads/2014/06/WHO-Active-Ageing-Framework.pdf> 24 November 2023