



ISSN: 0975-833X

## RESEARCH ARTICLE

### A STUDY ON THE CURRICULUM DESIGN AND TEACHING STRATEGIES OF ELDERLY LEARNERS' FLIPPED LEARNING

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#### ARTICLE INFO

##### Article History:

Received 16<sup>th</sup> June, 2017  
Received in revised form  
24<sup>th</sup> July, 2017  
Accepted 15<sup>th</sup> August, 2017  
Published online 30<sup>th</sup> September, 2017

#### ABSTRACT

This study explores the needs of elderly learners regarding the curriculum design and teaching strategies of flipped learning, summarizes the conclusions and suggestions, and offers suggestions on how to adapt the learning and learning strategies of elderly learners to improve their interest, willingness to learn, learning outcomes, meet their learning needs, and achieve the learning objectives.

##### Key words:

Elderly Learners, Flipped Learning,  
Curriculum Design, Teaching Strategies.

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**Citation:** I-Chan Kao, 2017. "A study on the curriculum design and teaching strategies of elderly learners' flipped learning", *International Journal of Current Research*, 9, (09), 57889-57898.

## INTRODUCTION

### Research Motives

By the end of 1993, Taiwan's elderly population aged over 65 reached 7.10% of the total population, which indicated the coming of an aging society. In the same year, the number of elderly population corresponding to every 100 young people stood at 28.24 (i.e., aging index = population aged over 65/population aged 0-14 \* 100). By the end of 2016, Taiwan's elderly population accounted for 13.20% of the total population, and the Aging Index increased by 98.86% year-by-year. It is estimated that the proportion of the elderly population will reach 14% in 2018 (i.e., entering the aged society), and 20% by 2026 (i.e., entering the super aged society) (Ministry of the Interior, 2017). Related government authorities are aware of this aging trend of population. The topic of education and the study of the elderly population are important regarding the policies and programs proposed in response to the aged society. The Ministry of Education (2006) published a White Paper on Senior Education Policy, planned educational visions of lifelong learning, health and happiness, independence and dignity, and social participation, which was expected to create a diversified learning environment and

activities to meet senior's needs for physical and mental activities. It formulated the "creating new diversified learning contents for elderly education", and placed emphasis on organizing science and technology information research activities in an effort to enhance the information competency of the elderly. According to the comments provided in Wikipedia, flipped teaching, also known as flipped classrooms, is a type of blended learning that reverses the traditional learning environment by delivering instructional content outside the classroom. In other words, students watch the online teaching videos provided by teachers "outside of the classroom" (before classes), and complete their homework or exercises with teachers and classmates (cooperative learning) in the classroom (Liu, 2014; Sams and Bergmann, 2012). Flipped teaching is a teaching approach that shifts one-way teaching from a group learning space to an individual learning space, while the group space is transformed into a dynamic, interactive learning situation, where teachers guide students to apply ideas, develop creativity, and engage in studying different subjects (Wang (trans), 2015). However, the majority of the current subjects of flipped teaching are primary and secondary school students, as well as university students. Therefore, a topic worth exploring is whether flipped teaching can be effectively introduced to the learning activities of the elderly population, in order to satisfy the learning needs of the elderly. Recently, numerous studies on the elderly's application of digital information technology have found that the most common application range of the elderly include

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entertainment, communication, shopping, learning, and health care. These results demonstrate that the quality of and satisfaction with life of the elderly population are enhanced by the use of digital information technology (Dorin, 2007; Erickson and Johnson, 2011; Etchemendy *et al.*, 2011; Russell, 2011; Wang, Locke, and Burton, 2011; Yueh *et al.*, 2012; Huang, 2012; Lai, 2016). Dorin (2007) believed that online learning allowed physically ill elderly people, such as those with mobility difficulties and chronic diseases, to study at home, and could benefit rural elderly learners or those too busy to attend physical courses on a regular basis. Moreover, he particularly stressed that the current online learning environment provided voice and image functions, which would allow elderly learners to interact with others via the Internet and achieve the purposes of informal learning and socializing. Githens (2007) pointed out that teachers should pay special attention to technical issues, usability issues, curriculum design, use of new technology, and other issues, in the design of digital learning materials for the elderly. Renaud and van Biljon (2008) investigated elderly people aged between 60 and 92 to understand the factors affecting their use of digital tools, which included social effects, perceived usefulness, supporting facilities and conditions, easy learning, and usage, and summarized the Senior Technology Acceptance and Adoption Model (STAM).

However, Lin (2002) held that lack of self-confidence, the belief of being too old, lack of learning motivation, proneness to anxiety, and psychological factors, were the reasons for the learning disabilities of the elderly. Huang (2004) analyzed the learning problems of the elderly which included health problems, response time and slow actions, failing eyesight, hearing loss, and poor memory. The study by Chen (2006) showed that the factors included physical barriers, psychological disorders, and learning disabilities. Tsai and Yeh (2009) included the elderly learners from Sung-Nien University as the subjects, and found that the factors of the elderly learners' learning disabilities were divided into psychological factors, physiological factors, institutional factors, programs and teaching factors, and situational factors. Additionally, Chiang (2006) suggested that elderly people's engagement in online learning activities resulted in physiology, psychology, family, basic computer ability, and other learning disability factors; among these factors, failing eyesight posed the greatest obstacle to online learning.

This study focuses on flipped teaching, which is actively promoted in the programs and teaching activities of primary and secondary schools at present, and cases are even introduced in professional function training. The "general face-to-face teaching" courses, as taught by this researcher, and implemented by the Open University of Kaohsiung, is a blended teaching method integrating the distant learning of online digital courses and physical face-to-face teaching", which is similar to the implementation method of flipped teaching during the operation of teaching practice. In other words, prior to face-to-face teaching, students will first read the online teaching courses produced by teachers, and then, during face-to-face teaching or in the online teaching platform, they can engage in discussions regarding the online teaching courses with teachers and classmates. This coincides with the process where learning effectiveness is constantly improved through course previews, classroom discussions, and after-school reflection and application. However, the obstacles for elderly learners through online learning are caused by

inevitably aging issues, which produce a negative impact on the preview activities of online courses. Thus, the motives of this study include how to design curriculum design patterns for flipped teaching and adaptive teaching strategies for elderly learners, how to effectively assist elderly learners, and how to overcome learning obstacles, meet their learning needs, and enhance their learning effectiveness through the diverse teaching activities of flipped teaching.

### Research Purposes

Based on the foregoing discussions about the research motives, the purposes of this study are presented, as follows:

- To understand the curriculum design and teaching strategies of flipped teaching.
- To explore the learning characteristics of elderly learners.
- To analyze the key success factors for elderly learners' participation in flipped teaching.
- To put forward curriculum design patterns and teaching strategies of flipped teaching for elderly learners, which can satisfy elderly learners' learning needs and fulfill their learning objectives.

### Curriculum Design and Teaching Strategies of Flipped Teaching

Bergmann and Sams (2012) pointed out that, in the classrooms of flipped teaching, attempts were made to establish a framework meeting the learning needs of students. In the learning process of a flipped classroom, in addition to reading planes or online teaching materials, students must also actively ask questions, and discuss and share related learning information with teachers and peers. Students play the role of active learning, while teachers primarily play the role of learning facilitators and helpers. Stone (2012) also indicated that teachers must put in extra efforts to achieve the desired results in flipped teaching. Huang (2016a), Abeysekera and Dawson (2014), Bishop and Verleger (2013), and Kim *et al.* (2014) argued that flipped teaching could instruct students to teach themselves by making good use of the network and technology tools. In classroom activities, flipped teaching emphasizes interactions and discussions among teachers, students, and peers, and establishes the goal of developing students' problem solving, application, analysis, assessment, and learning abilities. As a result, flipped teaching is a teaching method that directly implements the teaching contents, which are explained by teachers in the classroom before class in order to increase the chances of interactions among teachers, students, and peers in the classroom, and teachers could have more time to guide students to discuss and contemplate the problems, help students to resolve the problems, and thus, enhance learning effectiveness (Huang, 2016a; Bishop and Verleger, 2013; Chao, Chen, and Chuang, 2015). Huang (2016b) held that flipped teaching followed certain implementation principles, such as active learning, peer feedback, and learning by doing, and included various bases, such as theories of motivation, constructivism, experimentalism and scaffolding instruction. According to scholars (Li, 2013; Huang, 2016c; Kim, Kim, Khera and Getman, 2014), flipped teaching enables students to understand and clearly explain topics within 15 to 20 minutes, and provides students with instruction methods for reading course contents before class; meaning it designs the self-

learning motivation mechanism before the courses, establishes an assessment mechanism for assessing students' understanding of the teaching film contents, ensures clear coherence between online activities and classroom activities, and clearly defines classroom activities. In addition, it provides unambiguous guidance on course structure and scaffolding instruction, and plans enough time for students to complete assignments. Moreover, based on course needs, it sets up a learning community and provides adaptive tips and feedback on learning activities for individuals and groups, employs familiar and easy-to-use teaching technology tools, uses appropriate blended teaching methods, considers possible design alternatives for students from different families and learning environments, and adopts other principles of flipped teaching. Wood, Bruner, and Ross (1976) pointed out that, when designing the course activities of flipped teaching, teachers should consider whether the course activities could stimulate students' involvement, whether the course contents should be reorganized, whether the activities have clear learning objectives, whether the activities could guide students to identify key points, whether the activities have setback control, and whether the activities provide demonstration, namely, the six functions of scaffolding instruction (Huang, 2016d). By integrating the viewpoints of scholars and teaching practitioners, the curriculum design methods of flipped teaching are detailed, as follows: (Chen, 2013; Hsueh and Hsueh, 2013; Shyu, 2014; Liu, 2014; Tseng and Tsai, 2015; Yeh and Yang, 2016; Yeh, 2016; Hsu, 2016; Bergmann and Sams, 2012; Khan, 2012):

### **1. Students preview the teaching materials, as specified by teachers before class**

Before class, students teach themselves and complete the learning tasks provided by teachers, including the study of handouts, repeatedly watching online teaching materials or designated preview homework, understand and memorize courses to construct their own learning structure, pose and clarify problems in the forum in case of any doubts, and repeatedly conduct self-assessment until mastery of the course contents is achieved.

### **2. Students interact and discuss with teachers and peers in the classroom**

During the class, teachers' delivery of new courses is no longer the focus; instead, the classroom activities of discussing and exploring problems are conducted, in order that students can jointly resolve problems through interactions with teachers and peers. Finally, the teacher sums up the focuses and provides feedback to allow students to have more in-depth understanding of the courses, and their application. Therefore, through teachers' guidance in the classroom, students can complete exercises, discuss homework, assess and observe works, and team up with peers to discuss and study in an effort to enhance learning outcomes.

### **3. Students' reflection and application of learning outcomes after class**

Students construct their own knowledge structure through preview before class and cooperative learning during class, and thus, develop high-level cognitive skills through "thematic inquiry" after class, as designed by teachers, with the intention of advancing from the stage of basic knowledge acquisition to

"knowledge transfer and application". Consequently, students sort out the learning outcomes before and during class through reflection, examine whether the learning outcomes meet their expectations, and formulate action strategies, which are applied to solve the problems of life and work, and conduct self-assessment of application effectiveness. From the 1980s, educational circles in Europe and the United States have promoted the trends of constructivism-based education reform. In addition, problem-oriented teaching strategies became the mainstream, and schools began to popularize Inquiry-Based Learning, Context-Based Learning, Experience-Based Learning, Problem-Based Learning, and other teaching strategies, and other such teaching strategies, such as Case-Based Learning, Protect-Based Learning, and Action Learning were widely used in corporate training programs (Wang, 2015). Huang and Chu (2017) pointed out that the flipped teaching strategies integrating action learning included the direct instruction method, peer assessment method, video sharing method, the sharing collaborative platform, theme discussion learning model, the application of mind-tools, Project-Based Learning, digital storytelling, Inquiry-Based Learning, Context-Based Learning, and competitions.

Wlodkowski (1999) believed that teaching strategies intended to improve adults' learning efficiency must consider the problems that concern adult learners, as well as their experiences and expectations, and divided adult learners into cooperative learning groups for discussion and sharing. Second, adult learners decided a topic they wanted to study and explore, and were guided to think about related feasible learning activities. Then, "critical questioning and prediction" were employed to strengthen the significance of learning activities. A research team, activity team, or community of practice was established, and answers to a set of questions and predictions were designed to assist adult learners to create attractive and challenging learning experiences. Eventually, self-assessment methods were adopted. After the previously predicted answers were confirmed, adult learners were required to share or write their learning achievements during this exploration. Therefore, flipped teaching was effective and could flip the learning significance of adult learners. In the design orientation of teaching strategies, teachers could, through social changes or trends of interest to adult learners, guide adult learners to independently connect new and old experiences, exchange and share different experiences, and encourage the creation of new knowledge or problem solving abilities, in order to meet the learning motivations and needs of adults (Chen, 2013).

The researcher works as a teacher at the Open University of Kaohsiung, and conducted informal semi-structured interviews with eight elderly students aged over 60 during the first semester of the 2016 academic year, and put forward the participation of the Open University of Kaohsiung in the "general face-to-face teaching" courses (that is, blended teaching activities integrating online distance teaching and 4 face-to-face teachings sessions in one semester). In the learning process, by summarizing the statements of the interviewed students, the teaching methods and contents that students can most effectively accept, adapt to, and absorb included wonderful verbal explanations of teachers, putting forward practical questions and seeking answers, students' discussions regarding how to solve problems, offering sufficient time to think and practice assignments, case analysis, teachers' clear demonstration of calculation or the processes of

skills operation, group cooperative completion of assignments, digital teaching materials' reinforcing visual and auditory effects, holding outdoor activities and visits, and arrangements of presenting learning achievements in the rostrum. The above interviews, as held by the researcher, were conducted in the mode of chats during afternoon tea. Although the interviews were not conducted in accordance with rigorous research standards, and the students were not the samples obtained by random sampling, the interviewed students earnestly hoped teachers' teaching could be continuously improved, in order to meet their learning needs in school, and effectively enhance their competency and interest in learning. The results of interviews with the elderly students from the Open University of Kaohsiung students are similar to the flipped teaching strategies commonly used in primary and secondary schools, such as the proper use of online teaching materials for digital learning, problem orientation and problem solving, thematic inquiry, and experience of practical circumstances, cooperative group discussions, familiar knowledge and skills, as well as case analysis. In conclusion, the curriculum design and teaching strategies of flipped teaching are applicable to primary and secondary schools, adult education above the university level, and the learning activities of elderly learners. In fact, regarding the actual teaching circumstances, adults can readily achieve self-directed learning. In particular, elderly learners are able to independently control their learning interests, scope, contents, and methods, in order to meet their learning needs, enhance their learning satisfaction, and effectively encourage the achievement of their learning goals.

### Learning Characteristics of Elderly Learners

The learning of the elderly, as based on their physical, psychological, and social status, and development tasks in different stages, is affected by physiological aging, biological phenomena, development stages, and social culture, as well as psychological maturity, which constitute the peculiar aging of the elderly in learning. Huang (2004) believed that the learning of the elderly consisted of 10 characteristics: learning motivation was caused by life events or life changes; learning content was practical-oriented; learning structure was problem-centered; learning confidence was low; learning pressure was low; ability of lifelong learning; the better learning place was close proximity; better learning time was daytime; learning methods were integrated from top to bottom; learning objectives were to discover the meaning and value of life. Wei et al. (2008) maintained that elderly learners were learner-centered, aimed to cope with changes, did not like learning activities that caused considerable stress and developed the meaning of life, and that their learning effectiveness was to encourage healthy aging. Tsai (1996), Wu (1997), Chang et al. (2002), Wei et al. (2008), Chen (2013), and Wu et al. (2014) held that elderly learners had various characteristics, such as immediate learning motivation, continuous and lifelong learning, unique learning styles, problem-solving application, influence of life experience, self-concept positioning, and self-orientation. As a matter of fact, there were significant differences between adult learners and underage learners in prerequisite knowledge, experience, physical and mental status, and learning motivation. Therefore, teachers engaged in teaching must teach students according to their aptitude, enable the learners to produce meaningful learning outcomes, and encourage the satisfaction of learning needs and the achievement of objectives. Chang (2007) indicated that, in order to achieve the purposes of adaptive teaching for the

elderly, flexible teaching principles were important methods for successful teaching of the elderly. The flexible contents included:

- Flexible learning time;
- Flexible learning methods;
- Flexible learning progress;
- Flexible learning mentoring programs;
- Flexible learning assessment.

The participation of the elderly in learning activities has greater need of assistance and encouragement from teachers or peers, and adaptive teaching should be given based on the learners' characteristics and learning contents. Adaptation teaching is a kind of social fairness and justice, considers the status of each learner, does not neglect students that fall behind in their studies, and enables each elderly learner to make achievements. Huang and Chang (2010) held that adaptive education provided learners with learning that meet their individual characteristics and needs, and allowed individuals to tap their potential, and hence, achieve self-fulfillment. As elderly learners have diverse learning characteristics, including differences in experience, ability, interest, sexual orientation, culture, and style, they need different teaching methods. Thus, teachers must teach elderly learners according to their differences in characteristics, in order that all elderly learners could meet their learning needs and effectively achieve their learning objectives. Chang, Chen, (2013) and Tseng (2004) argued that elderly learners, at the physiological level, faced visual and auditory dysfunctions, longer response time, memory loss, and impaired function of the discharge system. At the physiological level, their intellectual development tended to be stable, and they had strong self-esteem, low confidence in learning, and active participation in learning. Moreover, their main learning motivations were trueness rather than speed. At the social level, the purpose of their learning was to complete development tasks and diversify their social life experiences. Lin (2002) maintained that the personal background variables of elderly learners, such as age, educational background, and living conditions also affect their learning motivation. Tsai and Juan (2011) grasped the learning needs of the elderly, and considered such needs in activity design and program planning.

McClusky (1971) put forward the viewpoint that educational intervention could provide quality of life for the elderly, and classified elderly learning needs into perfunctory needs, performance needs, contribution needs, impact needs, and need of transcendence. Hu (2012) argued that, in learning activities designed for the elderly, in addition to general situation analysis, it was necessary to carry out needs assessment, and collect information about their needs assessment through learners' questionnaire survey, individual interviews, observations, tests, forums, expert opinions, and scholars review of research reports. In these ways the learning activities of the elderly could be observed and assessed. Thus, the characteristics and orientation of elderly learners' learning patterns and learning needs allowed teachers to better grasp the learners' needs, and properly design adaptive teaching strategies in the planning or curriculum design of learning courses and programs for elderly learners. Application of digital network systems in the learning process are increasingly popular, and elderly learners' ability to use networks to obtain information tend to be increasingly important (Hilt and Lipschultz, 2004). Consequently, Ren (1999) and Wu and Tsai

(2006) believed that, for elderly learners, teachers, peers, and family members should help the learners to develop more effective network usage strategies, offer emotional encouragement and feedback in a timely manner, help them to take a positive attitude when using a network, and encourage learners to enhance self-efficacy. In this way, the learners have more confidence in using a network, their times of using a network would increase accordingly, and they can gain better results. Li (2008) pointed out that, when elderly learners thought that they could independently plan and conduct self-judgment self-oriented learning according to their own way, their network self-efficacy could be improved, which could encourage learners to independently conduct more satisfactory self-learning.

Lu and Lu (2005) pointed out that the teaching strategies of adult education institutions implementing adult distance learning in Taiwan, such as the National Open University, may have the following designs:

- Digital network services and diverse teaching environments are provided, which could provide digital network teaching and discussions, diversify teaching environments, and offer learners customized choices.
- Digital platforms are provided for cooperation with external institutions, lifelong education is promoted, and a digital learning platform is unveiled through industry-academy cooperation, in order that people may have the opportunity to continue receiving education.
- Teaching materials are digitally reserved, in order that learners can consult such materials at any time. The teaching materials are digitally stored in the platform, thus, learners and scholars can update the contents at any time to improve mutual interaction.
- Digital learning can establish a learning process system, and the learners' learning process can be clearly recorded on the learning website, thus, digital learning becomes their personal learning files.
- Digital learning networks can integrate administrative and teaching organization systems, integrate the school's administrative and teaching resources, as well as the different departments of the school, in order to improve the efficiency of teaching and administrative organization.

However, Lai (2016) pointed out that, according to the results of interviews with teachers teaching elderly learners, they still preferred the learning style of physical and face-to-face teaching. The interviewed teachers indicated that, one important factor for the elderly to study was socializing, meaning exchanges with teachers and peers. A complete online learning environment lacks interpersonal interaction, which easily caused elderly learners to feel lonely and a lack of support from peers. Furthermore, elderly learners had little confidence in technology, and still needed the guidance of teachers.

Thus, digital courses for the elderly are more suitable for mentoring and previewing, or reviewing the online courses prepared by teachers. In addition, due to the significant aging of elderly learners' physiological functions, the operation of digital learning courses should be as simple and intuitive as possible. In addition, course contents should be graphics-based, the text font size should be increased, and the operation

steps decreased, in order that elderly learners can confidently operate and browse digital courses.

### **Key Success Factors for Elderly Learners' Participation in Flipped Teaching**

Physiological, psychological, and even social and cultural factors cause a gap between elderly learners' learning behaviors and their expected effectiveness, thus, sharpening the learning abilities of elderly learners will help the performance of their learning effectiveness. Additionally, according to the Flipped Learning Network Hub, four major dimensions are proposed, including a flexible environment for flipped learning, a learning-centered culture, clear learning contents, and professional teachers, which are the key effective teaching factors (Huang, 2016c). The implementation of the flipped classroom model applies teacher-centered and student-centered teaching methods, and constructs the learning process as a "co-learning" process. The use of technology opens new situations for power-sharing, teachers' integrated program planning, the ability to apply digital technology, and other characteristics (Tsai, 2015). In the flipped teaching model, students can learn in ways that meet their own learning speed, which will allow them to truly become the master of their own learning process, and in addition to actual learning help, can further help them to form and develop the habit of deep thinking. In the implementation of the flipped teaching model, teachers may hone their abilities in independent curriculum planning and applications of science and technology. In the process of innovation and problem-solving, they can enhance their professionalism, and in addition to more dialogs between teachers and students, they can engage in more in-depth reflections of their teaching methods and improve their empowerment and ability in teaching. Thus, the processes and steps encourage elderly learners to be self-directed in managing their learning activities. Rather than passive participation of the elderly in flipped learning courses, the interest of the elderly should be kindled, which will allow them to take the initiative to participate in flipped learning activities. Therefore, elderly learners are trained to have the ability to independently learn courses, and manage the self-learning contents and procedures based on their own views, values, and preferences. The elderly learners dominate the entire learning activities, while teachers act as helpers and consultants, and guide elderly learners' to achieve happy and smooth learning needs.

Gagne (1977) employed relevant learning theories to develop teaching models, and emphasized that teaching processes could be established through motivation, understanding, memory, recall, generalization, execution, and feedback. Consequently, the process of elderly learners' participation in flipped learning activities is, as follows: First, learning needs are understood, need categories assessed, and learning objectives and learning activities collected and developed. Second, according to the principle of individual differences, sequential and hierarchical learning objectives are set. Third, the contents of learning activities should be applicable and practicable, in order that course contents and learners' experiences are integrated to maintain learning motivation. Finally, the assessment of achieving learning objectives should adopt self-assessment supplemented by peer assistance and cooperation, in order to satisfy learning needs, assist elderly learners to produce peak learning experiences, and guide their achievement of the learning objective of "self-realization". The elderly continuously participate in learning. In addition to being

practitioners of lifelong learning, they take an active part in a wide range of learning groups and develop friendly interpersonal interactions, which are the main factors supporting the elderly to constantly participate in flipped learning. Tsai (1995) proposed the principle of adult learning assessment, which is also applicable to the elderly, and was detailed, as follows: assessment should be based on teaching objectives; assessment methods should be diversified; assessment should consider individual learning characteristics; assessment should consider both learning and results; interpretation of assessment shall emphasize self-comparison and avoid mutual comparison, and should not place too much emphasis on scores and grades, provide learners the opportunity to participate in the assessment, and allow learners to obtain a sense of accomplishment from the assessment results. Moreover, as the elderly already have specific experience in using intelligent products, when coupled with cloud services, the elderly could record their own learning experiences on the online learning platform (through image or text records). Both teachers and peers could give feedback on the platform. Furthermore, this platform could be linked to audio and video sites regarding subjects related to the courses. The elderly could browse all learning resources on the platform, and hence, interact and share with peers on the online platform.

A key success factor for elderly learner participation in flipped teaching is that their learning performance would be more optimistic if they are allowed to adjust their own learning pace. Second, the teaching materials, as provided by instructors, should be effectively arranged in advance, such as arrangement in the space-time relationship, as well as the relationship between each other and content level, which could enhance their learning performance. Third, the use of media, that is, linking words or messages to be learned with other words, images, or stories, will help learners to establish the relationship between old and new facts, which meet the individual learning model. Fourth, enabling elderly learners to understand their demands and needs, and direct the contents to meaningful fields where students engage in, and fulfill, teachers assigned tasks. Finally, standardized and consistent assessments should be used as little as possible, while individual self-assessment methods should be used as often as possible. Offering elderly learners greater support and praise is the best way to give feedback (Chiu, 1993). The professional requirements for teachers working on flipped teaching for elderly learners are stricter than those for teachers engaged in traditional teaching. During face-to-face teaching in class, teachers must always observe the learning status of elderly learners, provide timely feedback, and assess the publication of the learning outcomes and works of elderly learners. Consequently, professional flipped teaching teachers will actively reflect on classroom activities, discuss with other teachers to improve teaching, accept constructive criticism, and readily tolerate disorder in classroom, as resulting from discussions and the hands-on process. In fact, in a flipped teaching classroom, professional teachers are less likely to dominate the learning activities, as they allow elderly learners to participate in learning activities in a self-oriented manner, and encourage flipped learning, in order to show the learning benefits.

### **Curriculum Design Model and Teaching Strategies of Flipped Teaching for Elderly Learners**

This study maintains that it is necessary to adjust and change the requests for the elderly to act in complete accordance with the curriculum model and teaching strategies of flipped teaching, as implemented in general primary and secondary schools and universities. There are significant differences in course teaching of the elderly and that of children or young people. Apart from the similarities in basic educational philosophy and principles, elderly learners are generally different from young students in terms of interactions between teachers and learners, the needs and objectives of adult participation in educational activities, and the relationship between the teaching and learning activities of children and young people, as well as learning venues, times, atmosphere creation, curriculum theme and design, arrangements, and implementation of teaching activities. In other words, the models for instructing children or young students cannot be used to instruct elderly learners; rather, teachers must follow the principles of adaptability and differentiation, and plan courses and teaching activities based on learning characteristics and needs of elderly learners.

Thus, this study suggests that the curriculum design and teaching strategies of flipped teaching for elderly learners' participation must fulfill the spirit and function of "teaching students in accordance with their aptitude", and design adaptive curriculum models and teaching strategies according to the learning characteristics and needs of elderly learners, in order to satisfy their learning needs and achieve their learning objectives in the process of flipped teaching. If teaching courses for the elderly intend to meet the goal of adaptive courses, that is, meeting the learning needs the elderly and improving their learning efficiency, the arrangements of adaptive courses for the elderly must consider numerous factors, including the characteristics and individual differences of elderly learners, such as gender, educational level, learning needs, learning motivation, social status, economic capacity, physical condition, and social support, as important references for curriculum design and implementation (Wu, 2011).

Knowles (1980) divided the learning methods preferred by adults into individual learning, group learning, community development, and community education. Peterson (1983) mentioned that the elderly like the learning method of discussions with peers, and preferred group learning. Owens, Nolan, and Mckinnon (1992) divided learning preferences into self-learning preferences, cooperative learning preferences, and competitive learning preferences (Lee, 2007; Sun, Wei, and Li, 2013). In addition, Kao (2016) included the global needs of adult learning as a research topic, and through a questionnaire survey, found that middle-aged and elderly learners preferred learning global concepts through cognitive apprenticeship, constructive orientation, group cooperation, thematic inquiry, problem solving, critical thinking, self-orientation, remote networks, creation, and rapidity.

Sun, Wei, and Li (2013) included elderly learners in Singapore as the subjects, and employed the semi-structured interview method to study the learning preferences of elderly learners. The results found that elderly learners preferred group learning, teachers' serious teaching attitude with more positive encouragement, and the integration of diverse teaching activities and skills, but disliked teaching methods without interaction. Therefore, prior to flipped teaching, teachers should increase their professional education knowledge and skills for teaching elderly learners, and understand the

characteristics and learning preferences of elderly learners. Furthermore, teachers should offer more encouragement to learners, have more interactions with students, appropriately integrate group discussions, role playing, and different teaching techniques, and create a relaxed, lively learning atmosphere, in order to enhance elderly learners' willingness to participate in learning. Hu (2015) pointed out that the teaching of elderly learners may follow the following steps: creating a beneficial learning atmosphere -> creating a mutual planning mechanism -> diagnosing learning needs -> forming teaching goals -> designing a learning experience model -> guiding learning activities with appropriate techniques and teaching materials -> assessing learning outcomes and diagnosing learning needs. Teachers of adult education can make good use of the scaffolding instruction strategy, self-oriented strategy, theater strategy, interactive strategy, whole brain learning strategy, and sandwich teaching strategy. Additionally, for the application of adult teaching methods, teachers can make good use of narratives, demonstrations and hands-on exercises, media-assisted teaching methods, group discussions, game teaching, picture puzzles, reality simulation, action teaching methods, experience-based teaching methods, project-based teaching methods, and role play. In summary, this study believes that the curriculum activity design of flipped teaching for elderly learners can be divided into before, during, and after class, in order to design adaptive curriculum activity contents and practical teaching strategies, which are presented, as follows:

### **(1) Preview reading and conception before class**

Educational institutions and instructors should first understand the students' gender, age, educational background, professional experience, professional knowledge and experience, physical and mental status, and learning characteristics and needs, in order to determine the objectives of an adaptive curriculum suitable for elderly learners, and plan learning guidelines, re-plan the original curriculum materials, allow elderly learners to finish homework before class, and encourage them to complete the matters and progress specified prior to face-to-face teaching. Second, teachers may, according to the physical and mental status of elderly learners, prepare digital online course materials, urge students through their learning records, and ask them to check their degree of completion. Third, teachers should produce a mental map for curriculum focus and topics discussed in class. Fourth, the matters that must be completed or prepared, including previewing and studying teaching materials, reading and listening to digital audio and video teaching materials, self-assessment and participation in online discussions before class, as well as the keywords regarding the ideas and topics discussed in the weekly class. Finally, teachers should encourage elderly learners to have online discussions and express their opinions via the applicable digital learning tools.

### **(2) Participation in discussions and careful reflection in class**

First, teachers should spend some time resolving the doubts of students, and explain their doubts in self-learning before class. Second, teachers may use mind mapping to briefly explain the focuses of self-learning before class, answer the questions posed by students, and put forward their practice and experience, and spend most of the time interacting with students, providing coaching, assisting with exercises, and

offering real-time feedback. While briefly explaining the focuses of self-learning before class, teachers can pose questions for students to consider, while students may also pose questions to teachers to offer real-time, substantial, and effective feedback; third, teachers should encourage students to participate in discussions before and during class to share their own experiences, and discuss topics and cases, and finally, teachers give feedback; fourth, teachers detect and ensure students' learning progress and independently assess their results to urge self-examination and understanding of the learning progress. By the end of class, teachers should explain the homework and progress expected in the next class, ask students to hand in their learning records of the current unit, provide the unit for the following week, and remind students of the learning progress expected in the next week.

### **(3) Practical application and reflection after class**

After the end of face-to-face teaching in class, teachers should remind and encourage elderly learners to apply their acquired knowledge and skills to life, promote transfer of their learning knowledge and skills, and play out the functions and effects of making their studies serve practical purposes. In addition, teachers may allow elderly learners to verify whether the contents taught by teachers can be effectively applied to actual situations, and such topics can be discussed in periodic course discussions before, during, and after class, and thus, guide elderly learners to gradually engage in active participation through self-directed learning. The elderly learners, through learning by doing, gradually understand the connotations of learning activities, in order to satisfy their learning needs and effectively achieve their objectives of participating in learning. Regarding elderly learners' flipped teaching strategies, in accordance with the aforesaid curriculum design process, it is necessary to understand the learning characteristics and needs of the learners, carry out planning of adaptive teaching strategies, and develop a wide variety of teaching strategies that meet the needs and preferences of elderly learners, as based on the curriculum activity design before, during, and after class. As mentioned above, from non-formal interview activities, this researcher learned that the more acceptable teaching strategies of educational institutions and instructors for elderly learners are, as follows: teachers are skillful in explaining teaching contents in both online and face-to-face learning; teachers have frequent two-way Q and A, interactions, and exchanges with students; conduct discussions about practical problems; teachers can independently demonstrate the operational processes of knowledge or skills; provide adequate exercise time for elderly learners to become familiar with the knowledge or skills; arrange informal presentations of learning outcomes; produce audio-visual teaching materials suitable for elderly learners; provide more relevant cases for joint analysis and discussion; encourage group cooperation to complete all types of learning activities and tasks; arrange outdoor teaching activities for situational experience.

### **Conclusion**

With the advent of society featuring advanced age and fewer children, governments are confronted with how to cope with the gradual increase in the elderly population, as well as the increased social burden. Lifelong learning means never being too old to learn, and is one of the coping strategies for an aging society. How to encourage the elderly to devote their time to

lifelong learning activities, which meet their learning needs and effectively achieve their learning objectives, has become an important topic explored by adult education circles. The operational pattern of flipped teaching is one of the innovative teaching models actively promoted by different levels and kinds of education in Taiwan. In particular, the blended teaching model integrating online digital teaching and physical face-to-face teaching is valued by the current information-based society for the common application of information and communication technology tools. The educational administrative organs of governments at all levels in Taiwan actively carry out policies to promote the flipped teaching model, and introduce flipped teaching into teaching activities in a bid to improve students' learning interest and effectiveness.

As a matter of fact, flipped teaching stresses independent study, cooperative discussion, sharing and interaction, learning by doing, differentiated and adaptive learning, and other concepts, and is very similar to the learning characteristics of the elderly. Thus, this study puts forward the idea of preview reading and conception before class, participation in discussions, careful reflection in class, practical application and reflection after class, and other curriculum design patterns of flipped teaching for the elderly. Moreover, it proposes interesting, lively, and humorous teaching, dialog-based teaching communication between teachers and students, problem-oriented teaching, cooperative group discussion teaching, mastery teaching featured by individual use of time resources to strengthen familiarity of knowledge and skills, presentative instructions featured by diverse presentations and sharing of learning outcomes, adaptive online digital teaching for the elderly to read, teaching of analysis and discussion of practical cases, demonstration teaching for knowledge and skills practice, outdoor teaching activities for situational experiences, and other flipped teaching strategies for elderly learners, which is expected to help elderly learners successfully fulfill their learning objectives.

## REFERENCES

- Abeysekera, L., and Dawson, P. 2014. Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research and Development*, 34(1), 1-14.
- Bergmann, J. and Sams, A., (2012). *Flip your classroom: Reach every student in every class every day*. USA: International Society for Technology in Education (ISTE).
- Bishop, J. L., and Verleger, M. A. 2013, June. The flipped classroom: A survey of the research. Paper presented at 120th ASEE National Conference Proceedings, Atlanta, GA.
- Chang, D.Y. 2007. On the Importance of Lifelong Learning for the Elderly and the Principle of Mechanism Construction. *Taipei City Lifelong Learning Network Newsletter*, 38, 17-22.
- Chang, H.T., Chu, T.K., Chang, D.Y., Hung, M.W., Hu, Y.C., Fang, Y.L., Hu, P.Y. 2002. *Teaching Principles*. New Taipei City: National Open University.
- Chang, T.Y., Chen, P.L.(2013). Observation and Assessment of the Learning Behaviors of Elder Learners. *T and D Fashion*, 163, 1-19.
- Chao, C.- Y., Chen, Y.- T., and Chuang, K.-Y. 2015. Exploring students' learning attitude and achievement in flipped learning supported computer aided design curriculum: A study in high school engineering education. *Computer Applications in Engineering Education*, 23, 422-431.
- Chen, K.T. 2013. The Trend of Flipped Teaching -- Cloud Confrontation of Science and Technology and Education. *Forum on Training and Development*, 155, 11-22.
- Chen, T.L. 2013. Application of "Learning Design" Thinking for Promoting Effective Adult Learning. *T and D Fashion*, 161, 1-21.
- Chen, Y.S. 2006. *Research into Learning Experience of the Elderly at Open University of Kaohsiung*, Unpublished master's thesis, Kaohsiung City: National Kaohsiung Normal University.
- Chiang, C.L. 2006. *Research of obstacles and coping strategies of older people engaging in web-based learning*, Unpublished, master's thesis, Chiayi County: National Chung Cheng University.
- Chiu, T.C. 1993. *Education for the Elderly*. Taipei City: Psychological Publishing.
- Council for Economic Planning and Development (2012). *Policy Recommendations in Response to Aged Society*. [Http://www.cepd.gov.tw/dn.aspx?uid=775](http://www.cepd.gov.tw/dn.aspx?uid=775)
- Dorin, M. 2007. Online education of older adults and its relation to life satisfaction. *Educational Gerontology*, 33, 127-143. DOI:10.1080/03601270600850776
- Erickson, J., and Johnson, G. M. 2011. Internet use and psychological wellness during late adulthood. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, 30(02), 197-209. DOI:10.1017/S07149808110
- Etchemendy, E., Baños, R. M., Botella, C., Castilla, D., Alcañiz, M., Rasal, P., and Farfallini, L. 2011. An e-health platform for the elderly population: The butler system. *Computers and Education*, 56(1), 275-279. DOI:10.1016/j.compedu.2010.07.022
- Gagne, R. M. 1977. *The conditions of learning and theory of instruction*. New York, NY: Holt, Rinehart and Winston.
- Githens, R.P. 2007. Older adults and e-learning: Opportunities and barriers. *Quarterly Review of Distance Education*, 8(4), 329-338.
- Hilt, M. L., and Lipschultz, J. H. 2004. Elderly Americans and the internet: E-mail, TV news, information and entertainment websites. *Educational Gerontology*, 30, 57-72.
- Hsiao, S.P. 2008. Promotion Strategies of Service Learning of the Elderly. *Ming Hsin Journal*, 34 (1), 345-359.
- Hsu, TC (2016). Teaching Model of Applying Flipped Classroom to University Introductory Course of Calculator. In Taipei, KC (Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (179-196. Taipei City: Higher Education Press.
- Hsueh, C.H., Hsueh, C. 2013. Flipped Classroom Teaching based on iWonder Platform: teaching design of health food. *China Information Technology Education*, 4, 9-12.
- Hu, M. C. 2012. Design of Learning Activities for the Elderly. Published in Adult and Continuing Education, National Chung Cheng University (Chief Editor), Ministry of Education, *Advanced Training Materials for Senior Education Professionals by the Ministry of Education* (25-30. Taipei City: Ministry of Education.
- Hu, M.C. 2015. *Adult Teaching Strategies and Methods*. Retrieved on December 20, 2016, from: [www.zccc.tp.edu.tw/1012teacher/handout/download.htm](http://www.zccc.tp.edu.tw/1012teacher/handout/download.htm).
- Huang, C.K. 2012. Do Not Call Me Digital Illiterate!: Analyzing Elderly People's Successful Internet Experience

- through Strengths Perspectives. *Kaohsiung Normal University Journal*, 32, 135-157.
- Huang, F.S. 2004. *Learning of the Senior*. Taipei City: Wu Nan.
- Huang, J.J., Chang, C.Y. 2010. Make Learning More Successful: Ideas and Strategies for Adaptive Curriculum and Instruction. *Curriculum and Instruction Quarterly*, 13 (3), 1-22.
- Huang, K.C. 2016a. Definition, Purpose and Development of Flipped Classroom. Published in Huang, K.C. Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (1-20. Taipei City: Higher Education Press.
- Huang, K.C. 2016b. Theoretical Basis for Flipped Classroom. Published in Huang, K.C. Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (21-30. Taipei City: Higher Education Press.
- Huang, K.C. 2016c. Design Principles, Introduction Models and Elements of Flipped Classroom. Published in Huang, K.C. Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (31-52. Taipei City: Higher Education Press.
- Huang, K.C. 2016d. Activity Strategies of Flipped Classroom. Published in Huang, K.C. Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (53-70. Taipei City: Higher Education Press.
- Huang, K.C., Chu, H.C. 2017. *Implementing Patterns and Teaching Strategies of Flipped Classroom with Action Learning*. Retrieved on May 5, 2017, from: <http://asp.tmshtc.edu.tw/file/ann/%e8%a1%8c%e5%8b%95%e7%bf%bb%e8%bd%89%e7%9a%84%e5%8d%81%e7%a8%ae%e6%95%99%e5%ad%b8%e6%96%bd%e7%ad%96%e7%95%a5.pdf>.
- Institute for Information Industry (2003. *Best Guidance for Digital Learning*. Taipei City: Institute for Information Industry.
- Kao, I-Chan (2016. Empirical Study on the Learning Purposes, Contents, and Methods for Adults in Response to Globalization. *Storage Management Solutions, Issue1, January*, 199-220.
- Khan, S. 2012. *The one world schoolhouse: Education reimagined*. London UK: Hodder and Stroughton Ltd.
- Kim, M. K., Kim, S. M., Khera, O., and Getman, J. 2014. The experience of three flipped classrooms in an urban university: An exploration of design principles. *Internet and Higher Education*, 22, 37-50.
- Knowles, M.S. (1980). *The modern practice of adult education: From pedagogy to andragogy*. Chicago: Follett.
- Lai, H.J. 2016. E-Learning Course Design for Older Adults: Analysis of Instructors' Perspectives. *Journal of Gerontechnology and Service Management*, 4(3), 367-376.
- Lee, H.Y. 2008. *The Study of the Relationships among the Self-Directed learning, Family Support and Internet Self-efficacy of Middle-Aged and Elderly Adults*, Unpublished master's thesis, Taipei City: National Taiwan University of Science and Technology.
- Lee, S.Y. 2007. *Dissertation title: a study on the correlation between the learning preferences of elder learners, social support, and the sense of well-being*, Unpublished master's thesis, Kaohsiung City: National Kaohsiung Normal University.
- Lee, Y.X. 2013. *Four Steps of Successful Flipped Classroom, Education • Parenting Family Lifestyle Issue 44*. Retrieved on May 5, 2017, from: <http://www.parenting.com.tw/article/article.action?id=5048638>.
- Lin, C. M. 2002. Obstacles and Difficulties for Elderly Learners. *Adult Education*, 65, 44-50.
- Lin, L.H. 2002. *The study of relationship between participating learning activity and life satisfaction of older adult*, Unpublished master's thesis, Chiayi County: National Chung Cheng University.
- Liu, Y.F. 2014. Perspectives for modern training program development regarding flipped classroom phenomena. *T and D Fashion*, 201, 1-33.
- Lu, L.T., Lu, Y.J. 2005. A Study on Teaching Strategies of Taiwan National Open University from Lifelong Learning. *T and D Fashion*, 33, 1-21.
- McClusky, H. Y. 1971. The adult as learner. In S. E. Seashore and R. J. McNeill (Eds.), *Management of the urban crises*. New York, NY: The Free Press.
- Ministry of Education (2006. *Entering the Aged Society - White Paper on Education Policy*. Taipei City: Ministry of Education.
- Ministry of the Interior (2017. *Aged Society Has Come*. Retrieved on May 18, 2017, from: [http://www.moi.gov.tw/stat/topic\\_stat.aspx](http://www.moi.gov.tw/stat/topic_stat.aspx)
- Ministry of the Interior (2017. *Quick Report on Household Statistics*. Retrieved on April 14, 2017, from: <http://www.ris.gov.tw/346>.
- Owens, L., Nolan, P.C.J. and McKinnon, D. 1992. A comparison of the learning mode preferences of students in four countries: Australia, New Zealand, England and U.S.A. Paper presented at the *Annual Conference of the Australian Association for Research in Education, Geelong*.
- Peterson, D. A. 1983. *Facilitating education for older learners*. London: Jossey- Bass Publishers.
- Ren, W. H. 1999. Self-efficacy and the search for government information. *Reference and User Services Quarterly*, 38(3), 283-291.
- Russell, H. 2011. Time and Meaning in Later-Life Learning. *Australian Journal of Adult Learning*, 51(3), 547-565.
- Shih, WL, Tsai, CY, Chen, HH (2014. *Action Research into Applying Network Project-based Learning, Cooperative Learning and Flipped Teaching Strategies to Market Research Course*. Retrieved on May 20, 2017, from: <http://tanet2014.lt; RTI ID = 0.0 and gt;>
- Shyu, H.Y. 2014. Revelation of Flipped Classroom and Massive Open Online Courses to Education and Training. *Forum on Training and Development*, 167, 36-46.
- Stone, B. B. 2012, August. Flip your classroom to increase active learning and student engagement. Paper presented at *28th Annual Conference on Distance Teaching and Learning*, Madison, WI.
- Sun, JH, Wei, HC, Li, YH (2013. *Analysis of Singapore Elderly Learners' Learning Preferences: A Case Study of Singapore's Happy Class*. 2013 Taiwan Association of Gerontology The First Annual and International Conference, Retrieved on December 15, 2016, from: [http://tag.org.tw/admin/uploads/20130527204208\\_5862.pdf](http://tag.org.tw/admin/uploads/20130527204208_5862.pdf)
- Tsai, CC, Juan, HY (2011. *Research on the Relationship between the Senior's Learning Needs and Participation Willingness*. Retrieved on April 28, 2017, from: <http://ir.meiho.edu.tw/ir/handle/987654321/1314>
- Tsai, CC, Yeh, HC (2009. *Research on Obstacles to Participation of the Elderly in Lifelong Learning*. Retrieved on May 12, 2017, from: <http://ir.meiho.edu.tw/ir/bitstream/987654321/1316/1/%E9%AB%98%E9%BD%A1%E8%80%85%E5%8F%83%E8%88%87%E7%B5>

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- Tsai, H.M. 1995. Adult Learning Assessment. The paper is published at Adult Education Institute of Republic of China (Chief Editor), *Effective Adult Teaching* (381-408. Taipei City: Normal University Press.
- Tsai, J.C. 2015. Past, Present and Future of Flipped Classroom. *Pulse of Education of National Institute of Education*, 1, 1-11.
- Tsai, P.C. 1996. *Adult Education and Career Development*. Kaohsiung City: Li Wen Publishing.
- Tseng, S.H., Tsai, P.Y. 2015. Study on the Differences in University Students' Learning Strategies between Flipped Classroom Teaching and Traditional Teaching. *Shuangxi Education Forum*, 3, 1-19.
- Tseng, Y.J. 2004. *Study on Learning Patterns and Related Factors of Elderly Learners at Social Universities for the Seniors*. Unpublished, master's thesis. Taipei City: National Taiwan Normal University.
- Wang, F., Lockee, B. B., and Burton, J. K. 2011. Computer Game-Based Learning: Perceptions and Experiences of Senior Chinese Adults. *Journal of Educational Technology Systems*, 40(1), 45-58.DOI:10.2190/ET.40.1.e
- Wang, F.K. 2015. Flipped Classroom and Problem-oriented Teaching Strategies. *Epaper*, 163, HRD.
- Wang, S.L. (trans) (2015). *Flipped Learning*. Taipei City: Common Wealth Magazine
- Wei, H.C., Hu, M.C., Li, A.T., Huang, C.S., Tsai, C.C., Lin, P.I. 2008. *Training Manual for Planners of Senior Education Programs -- Introduction*. Taipei City: Ministry of Education.
- Wlodkowski, R. J. 1999. *Enhancing adult motivation to learn*. San Francisco, CA: Jossey-Bass.
- Wood, D., Bruner, J. S., and Ross, G. 1976. The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89-100.
- Wu, F.J. 2011. *A Study on Elder Learning and Adaptive Instruction*, Unpublished master's thesis, Taitung County: National Taitung University.
- Wu, M.L. 2014. *Successful Adult Teaching Strategies*. Retrieved on December 8, 2016, from: <http://learning.ace.nctu.edu.tw>.
- Wu, W.C. 1997. Research on Factors Concerning Participation Motivations and Learning Behaviors of Elderly Students at National Open University. *National Open University Research Report No. 22*. New Taipei City: National Open University.
- Wu, Y.-T., and Tsai C.-C. 2006. University students' internet attitudes and internet self-efficacy: A study at three universities in Taiwan. *Cyber Psychology and behavior*, 9(4), 441-450.
- Yeh, P.C., Yang, S.X. 2016. Application of Moocs in Flipped Classroom. Published in Huang, K.C. Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (133-153. Taipei City: Higher Education Press.
- Yeh, PC (2016). Teaching Model of Flipped Classroom Applied to Mathematics Courses: BTS Flipped Teaching Method. Published n Huang, KC (Chief Editor), *Flipped Classroom: Theories, Strategies and Applications* (153-168. Taipei City: Higher Education Press.
- Yueh, H. P., Lin, W.J., Lee, M.C., Lin, H.C., Luo, Y.C. 2012. A Study on Using iPad with Reading Operations for the Elders. *Teaching Technology and Media*, 101, 65-78.

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