

An Analysis of the Learning Efficacy of Open University Student's Participation in "Flip Learning": A Case Study of Open University of Kaohsiung

I-Chan Kao

General Education Center
Open University of Kaohsiung
Kaohsiung City, Taiwan
kic0929@ouk.edu.tw

Abstract—This study focuses on the students of Open University of Kaohsiung (OUK) and aims to understand their learning experiences when engaged in the flip learning model. The model is comprised of three successive steps: 1. Online learning prior to classroom interaction; 2. Classroom interactions during the semester; 3. Evaluation and counseling after the class. By conducting a questionnaire survey, this study analyzes students' satisfaction with respect to the flip learning model, the enhancement of their professional skills, their application of knowledge to work fields, and their work performances. The collected questionnaires are analyzed through SPSS, in order to understand OUK students' responses regarding teachers' teaching strategies and their learning. This study will provide the outcomes in terms of the flip learning model of the OUK experience, and based on the outcomes, present suggestions that may elevate students' learning efficacy.

Keywords—Open University, adult education, flip learning, learning efficacy

I. INTRODUCTION

Flip learning is also called flipped classroom, and is a kind of blended learning model, which flips meaningfully between traditional classes and extracurricular learning activities. In other words, students watch (self-directed learning) online learning videos provided by teachers "during extracurricular time" (before the class), while "in class", they work on assignments or practices with teachers and classmates (collaborative learning)[1],[2] Flip instruction is a kind of instructional measure, which moves one-way instruction from a group learning space to individual learning spaces. Group space is transformed into a dynamic and interactive learning situation in which teachers guide students to apply concepts, develop originality, and engage in learning different subjects [3]. However, at present, the numerous flip instruction subjects mainly refer to young secondary and elementary school students and university students. Can flip instruction be effectively introduced in adult learning activities to satisfy their learning demand and enhance learning efficacy? It is an issue worthy of study.

This study focuses on flip instruction, which is, at present, actively implemented in the curriculum and instruction of secondary and elementary schools. The said instruction is even

introduced in professional occupational training. In the Open University of Kaohsiung (OUK) where the researcher works, the practiced online learning course is blended instruction, which combines distance instruction of online digital courses and physical face-to-face instructions. The operation of instructional practice is similar to the implementation of flip learning. In other words, before face-to-face instruction, students watch online courses produced by teachers. In face-to-face instruction or on the online instruction platform, they can interact and discuss with teachers and classmates regarding the questions in online course learning. By lesson preparation, class discussions, reflection, application after class, and continuous progress, they improve their learning efficacy.

The performance degree of learning efficacy must depend on the evaluation of learning processes and results. The outcome of adult students' participation in flip learning activities in the learning process can be assessed by their satisfaction with the learning items in the Open University of Kaohsiung. Secondly, it depends on the reinforcement and improvement of their knowledge and competence. Thirdly, it refers to their general performance to apply the knowledge obtained to their workplace. Finally, it attempts to determine if the application of knowledge can significantly enhance work performance.

Thus, this study treats adult students in the Open University of Kaohsiung as samples, and focuses on the course design model of adult students' flip learning and adaptive teaching strategy to effectively assist adult learners. Will multiple teaching activities of flip instruction satisfy their learning purpose and demand and enhance their knowledge and competence? Will they apply the acquired knowledge to the workplace and successfully reinforce their work performance? These are the motives of this study.

According to previous research background and motivation, the research purposes are elaborated, as follows.

1) *To explore the current situation of the Open University of Kaohsiung teachers' practice model of flip learning courses and adult students' learning efficacy.*

2) *To construct a questionnaire on the flip learning course practices of the Open University of Kaohsiung and learning efficacy.*

3) *To analyze the effect of flip learning course practices of the Open University of Kaohsiung on adult students' learning efficacy.*

4) *According to research finding, this study proposes conclusions and suggestions for the Open University of Kaohsiung to conduct an adaptive flip learning course practice model for adult students, in order to effectively reinforce their learning efficacy.*

II. LITERATURE REVIEW OF FLIP LEARNING COURSE ACTIVITIES AND LEARNING EFFICACY

A. Literature review of flip learning course activities

Bergmann and Sams (2012) stated that, in classroom of flip learning, they attempted to construct a framework that meets students' learning demands. In the learning process of a flipped classroom, in addition to reading papers or online teaching materials, students should actively pose questions, and discuss and share related learning information with teachers and peers. Students play the roles of active learners, while teachers mainly act as learning promoters and guides. Flip instruction means to implement teachers' lecture before class in order to increase interaction among students, teachers, and peers in class. Hence, teachers have more sufficient time to guide students to study and ponder problems, solve problems, and enhance learning efficacy [4], [5], [6].

Based on the perspectives of scholars and teachers, this study elaborates the course design of flip instruction, as follows [1], [2], [7], [8], [9], [10], [11], [12], [13], [14].

1) *Students' preview of teaching materials assigned by teachers before class*

Before class, students learn independently to accomplish tasks assigned by teachers, including reading the handouts, repetitively watching online teaching materials or assigned preview work, comprehending and memorizing the course, and constructing their own learning structure. When they encounter problems, they pose the questions in the forum and repetitively practice self-evaluation until they master the content of the course.

2) *Students' interaction with teachers and peers in class*

As class time no longer relies on teachers' lectures of new lessons, class activities are based on discussions and explorations of problems, thus, students solve problems by interacting with teachers and peers. Teachers generalize the key points and provide feedback, which allows students to profoundly comprehend and apply the course contents. Therefore, by teachers' guidance in class, students can practice the exercises, discuss assignments, evaluate work, learn from the models, and work with peers in groups to enhance learning efficacy.

3) *Students' reflection and application of learning after class*

By previewing before class and collaborative learning during class, students can establish their own knowledge structure. After class, through "thematic exploration", as designed by teachers, they can develop high-level cognitive

skills in order to make progress from the basic phase of knowledge acquisition to the level of "knowledge transfer and application". Therefore, by reflection, students generalize learning outcomes before and during class, and attempt to determine whether their learning outcome meets their expectation. Moreover, they can establish an action strategy to apply their knowledge to life and problem solving at work, and thus, develop self-assessment to review the effectiveness of the application.

B. Literature review of learning efficacy

This study adopts the Talent Quality Management System (TTQS), as implemented by the Workforce Development Agency of Taiwan, which is based on five processes of talent quality management for enterprises and training institutions, Plan, Design, Do, Review and Outcome, as well as 19 evaluation indicators. The items of "17a Reaction", "17b Learning", "17c Behavior", and "17d Outcome" of the 17th indicator of Outcome, are applied as the structure and items of the learning efficacy scale in this study [15], [16].

According to Kirkpatrick (1994) regarding TTQS outcome, assessment of training efficacy is divided into four levels, as constructed in the learning efficacy assessment model, and shown, as follows: (1) reaction levels: analysis of satisfaction is generalized as criterion to modify the following curriculum. (2) learning levels: includes examinations, practice reports, or other specific learning. The results and drawbacks are generalized in the final report as the criteria to modify the following curriculum; (3) behavior levels: allows learners to evaluate the after-class action program, which shows the related records and specific outcomes; (4) results levels: allows learners to determine if their learning efficacy meets the requirements of organization or work, and shows related records and specific learning efficacy [16], [17].

III. RESEARCH METHOD

This study explores the practice model of the flip learning curriculum and contents of adult students' learning efficacy, in order to construct a "questionnaire on the general situation of teaching activities of the flip learning curriculum and learning efficacy". Subsequently, this study treats adult students who studied general education courses in the Open University of Kaohsiung as the subjects to conduct a questionnaire pretest, in order to construct the reliability and validity of the questionnaire. Subsequently, it establishes a formal questionnaire and conducts a formal questionnaire survey.

In addition, after the questionnaire survey, this study conducts statistical analysis of the retrieved questionnaires. By descriptive statistics and inferential statistics, this study explores the subjects' participation in flip learning course activities and general cognition of learning efficacy; it also probes into the cognitive differences of adult students with different social variables on flip learning curriculum teaching activities and learning efficacy, and conducts correlation analysis. Finally, it generalizes the conclusions and proposes feasible strategies for curriculum teaching activities of adults' participation in flip learning, in order to effectively enhance adult students' learning efficacy.

The structure of the statistical analysis of this study is shown in Figure 1, which reveals the gender, age, education, department, and occupation of adult students in the Open University of Kaohsiung as social variables; secondly, curriculum teaching activities, such as students' online learning before class, instructional interaction in class, evaluation and guidance after class, lecture instruction, Q & A, study of problems, demonstration operations, mastery practice, demonstration instruction, audiovisual learning, case study, collaborative learning, and outdoor visits are independent variables; besides, perceived learning efficacy, such as learning satisfaction, enhancement of professional skills, application of knowledge to work fields, and work performance are dependent variables. By empirical study of the questionnaire survey and inferential statistical analysis, this study explores the relationships among the variables.

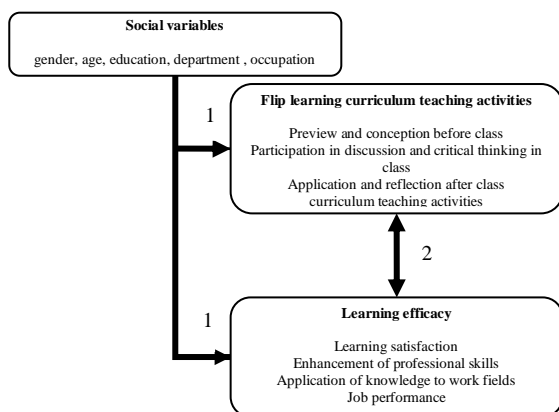


Fig. 1. Research structure, statistical analysis: (1) by t test and one-way ANOVA, it explores the cognitive differences of adult students with different social backgrounds on the course practices of flip learning in the Open University of Kaohsiung and personal learning efficacy. (2) By Pearson correlation analysis, it probes into the correlation between the flip learning curriculum teaching activities of the Open University of Kaohsiung and cognition of personal learning efficacy.

A. Scale of flip learning curriculum teaching activities

According to the CFA report by LISREL, the degree of freedom and chi-square statistics of the overall model are shown. Degree of freedom is 2043, chi-square value is 11171.83, and P value is 0.001, meaning there is significant difference between the hypothesis model and observation values. Other fit measures, NFI, NNFI, and CFI, are higher than 0.95, meaning the structures of items and dimensions are positive. In addition, according to analytical result of Cronbach's α , all dimensions are higher than 0.93, and all items are higher than 0.81, thus, internal consistency among dimensions is relatively high. Factor loading and Cronbach's α of the items of different dimensions are shown, as follows.

- Preview and conception before class. 01. Students preview the lesson of the teacher's upcoming course, 02. Students watch online course content, as produced by the teacher, 03. Students discuss the course with classmates. Regarding the factor loading of item "preview and conception before class", Items 01 to 03 are 0.68, 0.66, and 0.70, respectively. Cronbach's α of

the overall dimension is 0.93. Correlation between individual items and total item are higher than 0.85.

- Participation in discussion and critical thinking in class. 04. Students ask the teacher to answer questions regarding the lesson, 05. Students listen to the teacher's lecture content, 06. According to the course plan, students interact and discuss the contents with the teacher and classmates. Regarding the factor loading of item "participation in discussion and critical thinking in class", Items 04 to 06 are 0.74, 0.72, and 0.73, respectively. Cronbach's α of the overall dimension is 0.96. Correlation between individual items and total item are higher than 0.91.
- Application and reflection after class. 07. Students participate in after-class learning assessments, as arranged by the teacher, 08. Students accomplish the exercises assigned by the teacher, 09. Students apply knowledge, as instructed by the teacher, to work or life, 10. Students share what they have learned with relatives and friends. Regarding the factor loading of item "application and reflection after class", from Item 07 to 10, they are 0.68, 0.71, 0.69 and 0.70, respectively. Cronbach's α of overall dimension is 0.96. Correlation between individual items and total item are higher than 0.88.
- In addition, by informal interviews, the researcher interviewed adult students in the Open University of Kaohsiung regarding their preferred activities of flip learning, as arranged by the teachers, and generalized 10 items of curriculum teaching activities of adults' flip learning, as follows. 11. Attractive and animated lecture contents, 12. Frequent two-way interaction and communication with students, 13. Study of actual problems, 14. Demonstration of the operation of knowledge or skill, 15. Sufficient practice time to become familiar with knowledge or skill, 16. Presentation of learning outcome, 17. Digital audiovisual teaching activities, 18. Case analysis and discussion, 19. Accomplishment of learning task through team work, 20. Outdoor visit. Regarding the factor loading of item "curriculum teaching activities", Items 11 to 20 are 0.62, 0.68, 0.63, 0.70, 0.66, 0.70, 0.65, 0.68, 0.67, and 0.71, respectively. Cronbach's α of overall dimension is 0.95. Correlation between individual items and total item are higher than 0.84.

B. Scale of learning efficacy

This study conducts CFA by LISREL. As there are more items of the scale, the obtained result cannot reveal the relationship path diagram; however, the degree of freedom and chi-square statistics of the overall model are shown. Degree of freedom is 2043, chi-square value is 11171.83, and P value is 0.001, which means there is significant difference between the hypothesis model and observation values. Other fit measures NFI, NNFI and CFI, are higher than 0.95, which means the structures of the items and dimensions are positive. In addition, according to the analytical result of Cronbach's α , all dimensions are higher than 0.80 and all items are higher than

0.78, which reveals that the internal consistency among the dimensions is relatively high. Factor loadings and Cronbach's α of items of the dimensions are shown, as follows.

- Learning satisfaction. 01. I am satisfied with teachers' instruction, 02. I am satisfied with the contents of the teaching materials, 03. I am satisfied with the service of administrative staff, 04. I am satisfied with the instructional equipment, 05. I am satisfied with the rules and operation of the school. Regarding the factor loading of item "learning satisfaction", Items 01 to 05 are 0.61, 0.62, 0.63, 0.60, and 0.64, respectively. Cronbach's α of overall dimension is 0.85. Correlation between individual items and total item are higher than 0.82.
- Enhancement of professional skills. 06. I have learned professional knowledge of different subjects, 07. I have obtained professional skills of different subjects, 08. I have enhanced work engagement and dedication, 09. I have reinforced my confidence in work, 10. I have improved my adaptation to work. Regarding the factor loading of item "enhancement of professional skills", Items 06 to 10 are 0.60, 0.61, 0.63, 0.65, and 0.66, respectively. Cronbach's α of overall dimension is 0.83. Correlation between individual items and total item are higher than 0.82.
- Application of knowledge to work fields. 11. I can apply professional knowledge obtained to work, 12. I can apply professional skills obtained to work, 13. I can be totally engaged in work, 14. I can apply professional skills in my work environment, 15. I can apply professional skills to respond to changes to working situations. Regarding the factor loading of item "application of knowledge to work fields", Items 11 to 15 are 0.56, 0.57, 0.59, 0.58, and 0.60, respectively. Cronbach's α of overall dimension is 0.80. Correlation between individual items and total item are higher than 0.80.
- Job performance: 16. My job performance is reinforced; 17. My salary and welfare are increased; 18. My position is promoted; 19. The performance of my department is enhanced; 20. Overall return on investment for my organization (department) is enhanced. Regarding the factor loading item "performance", Items 16 to 20 are 0.52, 0.53, 0.54, 0.55, and 0.56, respectively. Cronbach's α of overall dimension is 0.80. Correlation between individual items and total item are higher than 0.78.

IV. RESEARCH RESULTS

By cluster random sampling, this study obtains 1000 on-the-job adult students in the classes of general education in the Open University of Kaohsiung, and conducts a questionnaire survey. It retrieves 936 valid samples, and conducts statistical analysis, such as descriptive statistics, means and standard deviations, t test, one-way ANOVA, product-moment correlation, etc. The research findings are shown, as follows.

A. Result of descriptive statistics

T Among the valid samples of gender, there are 466 males and the percentage is 49.8%; there are 470 females and the percentage is 50.2%. The percentage of females is higher than that of males.

Regarding the distribution of age, most subjects are aged 30~59 (790, 84.4%), followed by above 65 years old (80, 7.1%), and 60-64 years old (8.5%).

Regarding the distribution of education, most are graduated from senior high school and vocational school (455, 48.6%), followed by graduated from college and university (397, 42.4%), and completed graduate school (9.0%).

Regarding the distribution of departments, most are in the department of technology management (301, 32.2%), followed by "have not selected the department" (271, 29.0%), "department of industrial and business management" (140, 15.0%), "department of law and politics" (9.9%), "department of foreign language" (5.8%), "department of mass media" (5.3%), and "department of culture and art" (2.9%).

Regarding the distribution of occupation, "governmental employees" are the most (402, 51.2%), followed by "industry, business and service industry" (205, 21.9%), "retired" (127, 13.6%), "unemployed" (102, 10.9%), "production and manufacturing industry" (4.6%), "information service industry" (4.3%), and "agriculture, forestry, fishery and husbandry" (1.8%).

B. Current situation of participation in flip learning curriculum teaching activities and learning efficacy

Regarding the cognition of adult students in Open University of Kaohsiung on the current situation of flip learning curriculum teaching activities and learning efficacy, the statistical results of the means and standard deviations of different dimensions are shown in Table 1 and Table 2. According to Table 1, the means of adult students' cognition of the dimensions of flip learning curriculum teaching activities are all higher than 3.32, thus, adult students show medium level of cognition regarding flip learning curriculum teaching activities; according to Table 2, the means of adult students' cognition of the dimensions of learning efficacy are higher than 3.22, thus, adult students show a medium level of learning efficacy.

TABLE I. MEANS AND STANDARD DEVIATIONS OF ADULTS' COGNITION OF THE DIMENSIONS OF FLIP LEARNING COURSE AND TEACHING ACTIVITIES.

Teaching strategy	Average mean	Standard deviation	Number of items
Preview and conception before class	3.32	3.04	3
Participation in discussion and critical thinking in class	3.34	3.32	3
Application and reflection after class	3.34	4.42	4
Curriculum teaching	3.32	10.76	10

activities			
Overall flip learning curriculum teaching activities	3.33	10.97	20

TABLE II. MEANS AND STANDARD DEVIATIONS OF ADULT STUDENTS' COGNITION OF DIMENSIONS OF LEARNING EFFICACY.

Teaching strategy	Average mean	Standard deviation	Number of items
Learning satisfaction	4.00	2.42	5
Enhancement of professional skills	3.22	2.40	5
Application of knowledge to work fields	3.92	2.37	5
Work performance	3.86	2.49	5
Overall dimension of learning efficacy	3.45	7.36	20

C. Comparative result of difference of social variables

Regarding the difference analysis of gender, by t test, this study compares the cognitive differences between male and female adult students in Open University of Kaohsiung regarding flip learning curriculum teaching activities and learning efficacy. According to the statistical results, adult students of different genders in the Open University of Kaohsiung do not show significant difference in the dimensions of participation in flip learning curriculum teaching activities and learning efficacy. Hence, male and female adult students in the Open University of Kaohsiung reveal more consistent cognition regarding flip learning curriculum teaching activities and learning efficacy.

Regarding the difference analysis of age, by one-way ANOVA, this study compares the cognitive differences of adult students of different ages in the Open University of Kaohsiung regarding flip learning curriculum teaching activities and learning efficacy. According to the statistical results, adult students of different ages in the Open University of Kaohsiung do not reveal significant difference in the dimensions of flip learning curriculum teaching activities and learning efficacy. Hence, adult students of different ages in the Open University of Kaohsiung show more consistent cognition regarding participation in flip learning curriculum teaching activities and learning efficacy.

Regarding the difference analysis of education, by one-way ANOVA, this study compares the cognitive difference of adult students of different education backgrounds in Open University of Kaohsiung regarding flip learning curriculum teaching activities and learning efficacy. According to the statistical results, "preview and conception before class" (F value =7.16, P value =0.001), "participation in discussion and critical thinking in class" (F value =8.99, P value =0.000), "application and reflection after class" (F value =7.90, P value =0.000), "overall dimension of flip learning curriculum teaching activities" (F value =8.54, P value =0.000), "curriculum

teaching activities" (F value =12.36, P value =0.000), "learning satisfaction" (F value =3.47, P value =0.031), and "learning efficacy" (F value =3.78, P value =0.023) show significant difference. After conducting multi-comparison by the Scheffe method, this study realizes that adult students of the Open University of Kaohsiung who are graduated from "senior high school and vocational school" and "college and university" show significantly higher cognition regarding the dimensions of flip learning and curriculum teaching activities, as well as the overall dimension of learning efficacy, in comparison to those who are graduated from "graduate school". Adult students of the Open University of Kaohsiung who are graduated from "college and university" show significantly higher cognition regarding learning satisfaction, in comparison to those who are graduated from "graduate school".

Regarding the difference analysis of department, by one-way ANOVA, this study compares the cognitive difference of adult students of different departments in the Open University of Kaohsiung regarding the dimensions of flip learning, curriculum teaching activities, and learning efficacy. According to the statistical results, "preview and conception before class" (F value =5.48, P value =0.000), "participation in discussion and critical thinking in class" (F value =4.45, P value =0.000), "application and reflection after class" (F value =5.58, P value =0.000), "overall dimensions of flip learning curriculum teaching activities" (F value =5.47, P value =0.000), "curriculum teaching activities" (F value =5.36, P value =0.000), "learning satisfaction" (F value =2.87, P value =0.009), "application of knowledge to work fields" (F value =2.21, P value =0.040), "work performance" (F value =2.28, P value =0.034 and the "overall dimension of learning efficacy" (F value =3.02, P value =0.006) reveal significant difference. After conducting multi-comparison through the Scheffe method, this study realizes that adult students of the "department of law and politics" in the Open University of Kaohsiung show significantly higher cognition regarding the dimensions of flip learning curriculum teaching activities, in comparison to those of the "department of technology management" and "have not selected the department"; regarding "learning satisfaction", "application of knowledge to work fields", "performance", and "overall dimension of learning efficacy", no significant difference is revealed.

Regarding the difference analysis of occupation, by one-way ANOVA, this study compares the cognitive difference of adult students of the Open University of Kaohsiung with different kinds of occupations on flip learning curriculum teaching activities and learning efficacy. According to the statistical results, "application and reflection after class" (F value =2.37, P value =0.028) and "curriculum teaching activities" (F value =2.36, P value =0.028) show significant difference; however, multi-comparison of the Scheffe method does not reveal significant difference.

D. Comparative result of difference of social variables

By Pearson correlation analysis, this study explores correlation and degree of adult students in Open University of Kaohsiung among dimensions of flip learning curriculum teaching activities and learning efficacy. The Figures of product-moment correlation are shown in Table 3. According

to statistical result, as to dimensions and overall dimension of flip learning curriculum teaching activities and learning efficacy of adult students in Open University of Kaohsiung, based on Chang (2013), when correlation coefficients are 0.20~0.39, it is low correlation; when correlation coefficients are 0.40~0.59, it is medium correlation; when they are 0.60~0.79, it is high correlation. Therefore, between “preview and conception before class” and dimensions of learning efficacy, it is low degree of positive correlation. Between the rest dimensions of flip learning curriculum teaching activities and learning efficacy, it is medium and high level of positive correlation. It means that when adult students of Open University of Kaohsiung are more engaged in flip learning curriculum teaching activities, their learning efficacy is more significant.

TABLE III. CORRELATION ANALYSIS BETWEEN ADULT STUDENTS’ PARTICIPATION IN FLIP LEARNING CURRICULUM TEACHING ACTIVITIES AND THE DIMENSIONS OF LEARNING EFFICACY.

	Preview and conception before class	Participation in discussion and critical thinking in class	Application and reflection after class	Teaching activities	Flip learning curriculum teaching activities Overall
Learning satisfaction	0.33***	0.56***	0.45***	0.50***	0.48***
Enhancement of professional skills	0.32***	0.54***	0.50***	0.45***	0.50***
Application of knowledge to work fields	0.33***	0.42***	0.56***	0.52***	0.53***
Work performance	0.30***	0.40***	0.46***	0.41***	0.44***
Overall dimension of learning efficacy	0.38***	0.43***	0.62***	0.58***	0.61***

***p<0.001 n=936

V. CONCLUSION AND SUGGESTIONS

According to the findings, this study proposes conclusion and suggestions, as shown below.

A. Cognition of adult students in Open University of Kaohsiung on participation in flip learning course activities and learning efficacy is medium

According to the findings of this study, the means of the cognition of adult students in the Open University of Kaohsiung regarding the different dimensions of participation in flip learning curriculum teaching activities and learning efficacy are higher than 3, which suggests a medium degree of cognition. While current flip learning curriculum teaching activities are mainly implemented in the educational scenarios of secondary and elementary schools, the Open University of Kaohsiung adopts blended instruction of both online learning and face-to-face instruction, which is similar to the operation of flip learning. Adult students’ cognition of participation in flip learning curriculum teaching activities and learning efficacy is medium, which shows that flip learning curriculum teaching activities can be practiced in adult education, and it relatively

and positively influences adult students’ learning efficacy. Therefore, adult education can actively plan and construct a complete curriculum instructional model of flip learning, in order to allow adult students to enhance their learning efficacy.

B. Flip learning course activities fit the teaching activities in senior high schools, vocational schools and undergraduate courses of universities

According to the research finding, adult students of the Open University of Kaohsiung who are graduated from “senior high school and vocational school” and “college and university” show significantly higher cognition regarding the dimensions of flip learning and curriculum teaching activities, as well as the overall dimension of learning efficacy, in comparison to those who are graduated from “graduate school”. Thus, flip learning curriculum teaching activities are more appropriate to be implemented in senior high schools, vocational schools, colleges, and undergraduate courses of universities, as they are more effective to strengthen basic professional knowledge and competence. At present, the Open University of Kaohsiung only offers the educational system of undergraduate courses. Adult students who study in the Open University of Kaohsiung are mostly graduated from senior high schools, vocational schools, and colleges, and they more actively participate in different levels and categories of learning activities of currently planned flip learning curriculum. It is relatively effective to reinforce adult students’ professional basic knowledge and competence. Therefore, the Open University of Kaohsiung can construct the complete operations of flip learning curriculum instruction in order to strengthen the learning efficacy of adult students who are graduated from senior high schools, vocational schools, universities, and colleges.

C. Adult students of the department of law and politics are more active when participating in flip learning course activities

According to the research findings, participation of adult students of the department of law and politics in the Open University of Kaohsiung in flip learning curriculum teaching activities is significantly higher than those of the department of technology management and those who have not selected departments. The academic contents of students in the department of law and politics tend to be more difficult than courses in management and liberal arts education. In advanced global countries, undergraduate university students in the department of law and politics tend to superior students in social science. The main reason is that the knowledge of law and politics is particularly based on logic thinking and memorization, comprehension, application, analysis, comparison, and criticism of laws, in order to cultivate judicial officers, government employees, lawyers, etc. Preview before class, learning in class, and review after class have become the learning model of undergraduate university students of the department of law and politics, which is similar to the operations of flip learning curriculum teaching activities, and combines the blended instruction of the Open University of Kaohsiung. Therefore, adult students of the department of law and politics in the Open University of Kaohsiung more actively

participate in flip learning curriculum teaching activities, thus, it can plan a flip learning curriculum instruction module for the department of law and politics, which will enhance students' effective learning, while highlighting the characteristics of curriculum instruction in the department of law and politics.

D. Flip learning curriculum teaching activities can effectively enhance adult students' learning efficacy

According to the research findings, the participation of adult students in the Open University of Kaohsiung in flip learning curriculum teaching activities shows medium and high levels of positive correlation with learning efficacy. In other words, flip learning curriculum teaching activities reinforce adult students' learning efficacy. Therefore, flip learning curriculum teaching activities are appropriate for minor students in secondary and elementary schools, as well as the proper learning and operations of curriculum instruction for adult students studying in university. Particularly, in an information technology era with successively advanced online instructional resources, it can apply the instruction-assisted software and hardware of information technology, produce an online learning curriculum that meets adult students' learning demands, arrange complete physical face-to-face teaching activities, and after class, properly apply the knowledge and skills obtained to life and work situations to enhance learning satisfaction, knowledge, and competence, and fulfill the effectiveness of the application of knowledge to work fields, in order to strengthen job performance and well-being in life.

REFERENCES

- [1] J. Bergmann, and A. Sams, *Flip your classroom: Reach every student in every class every day*. USA: International Society for Technology in Education (ISTE), 2012.
- [2] Y. F. Liu, "Perspectives for modern training program development regarding flipped classroom phenomena," *T&D Fashion*, vol. 201, pp.1-33, 2014.
- [3] S. L. Wang, *Flipped Learning*. Taipei City: Common Wealth Magazine, 2015.
- [4] C. Y. Chao, Y. T. Chen, and K. Y. Chuang, "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*, vol. 23, pp.422-431, 2015.
- [5] J. L. Bishop, and M. A. Verleger, "The flipped classroom: A survey of the research," Paper presented at 120th ASEE National Conference Proceedings, Atlanta, GA, June 2013.
- [6] G. J. Hwang, "Definition, Purpose and Development of Flipped Classroom," in *Flipped Classroom: Theory, Strategy and Practice*, G. J. Hwang, Eds. Taipei City: Edu book, pp.1-20, 2016.
- [7] K. T. Chen, "Trend of Flip Instruction: Cloud Meeting of Technology and Education," *Forum on Training and Development*, vol. 155, pp.11-22, 2013.
- [8] C. H. Hsueh, and C. Hsueh, "Flipped Classroom Instruction based on iWonder: Instructional Design of Health Food," *China Information Technology Education*, vol. 4, pp.9-12, 2013.
- [9] T. C. Hsu, "Instructional Model of Flipped Classroom Applied in Course of Computer Introduction in University," in *Flipped Classroom: Theory, Strategy and Practice*, G. J. Hwang, Eds. Taipei City: Edu book, pp. 179-196, 2016.
- [10] I. C. Kao, "A Study on the Curriculum Design and Teaching Strategies of Elderly Learners' Flipped Learning. *International Journal of Current Research*," vol. 9, Issue, 09, pp.57889-57898, 2017.
- [11] S. Khan, *The one world schoolhouse: Education reimaged*. London UK: Hodder & Stoughton Ltd, 2012.
- [12] H. Y. Shyu, "Inspiration of Flipped Classroom and MOOCs on Educational Training," *Forum on Training and Development*, vol. 167, pp.36-46, 2014.
- [13] S. H. Tseng, and B. Y. Tsai, "Study on Difference Between Flipped Classroom Instruction and Traditional Instruction on University Students' Learning Strategy," *The Educational Forum of Soochow University*, vol. 3, pp.1-19, 2015.
- [14] P. C. Yeh, and S. H. Yang, "Application of Moocs in Flipped Classroom," in *Flipped Classroom: Theory, Strategy and Practice*, G. J. Hwang, Eds. Taipei City: Edu book, pp.133-153, 2016.
- [15] F. M. Hsieh, "Research on Key Factors of Successful Introduction of TTQS in Enterprises," *Conference of Human Resource Development and Project Management*, National Kaohsiung University of Applied Sciences, 2012.
- [16] Workforce Development Agency, Ministry of Labor, Retrieved on December 16, 2016, from: <http://ttqs.wda.gov.tw/>.
- [17] D. L. Kirkpatrick, *Evaluating training programs: The four levels*. San Francisco: Berrett-Koehler, 1994.