

Final Report of Project

Project No. : 2016 / 0230

Part A

Project Title: Developing a Community of Practice of Flipped Learning for ICT Teachers

Name of Organization/School: IT Discipline, Hong Kong Institute of Vocational Education

Project Period: From 01/2018 (month/year) to 03/2020 (month/year)

Part B

*Please read the **Guidelines to Completion of Final Report of Quality Education Fund Projects** before completing this part of the report.*

Please use separate A4-size sheets to provide an overall report with regard to the following aspects:

1. Attainment of objectives
2. Project impact on learning effectiveness, professional development and school development
3. Cost-effectiveness – a self-evaluation against clear indicators and measures
4. Deliverables and modes of dissemination; responses to dissemination
5. Activity list
6. Difficulties encountered and solutions adopted

** Final Report of Project should be submitted via “Electronic Project Management System” (EPMS). Once submitted, these reports are regarded as already endorsed by the supervisor of the school/the head of the organization or the one who signed the Quality Education Fund Agreement for allocation of grant on behalf of the organization.*

1. Attainment of Objectives

Objective statement

- (i) To promote student-centered learning for the development of domain knowledge
- (ii) To encourage teachers and students to adopt active and interactive learning pedagogy
- (iii) To develop learning and teaching materials for supporting student-centered learning

Activities related to the objectives

Table 1: Attainment of Objectives

Objective statement	Activities related to the objective	Extent of attainment of the objective	Evidence or indicators of having achieved the objective
To promote student-centered learning for the development of domain knowledge	<ul style="list-style-type: none"> • A Community of Practice of Flipped Learning for ICT teachers (CoP) • 7 project meetings 	Fully achieved	<ul style="list-style-type: none"> • 60 secondary schools have joined the CoP. • 48 secondary schools have started to use learning materials in the academic year 2018/19. • 12 secondary schools have started to use flipped learning materials in the academic year 2019/20.
To encourage teachers and students to adopt active and interactive learning pedagogy	<ul style="list-style-type: none"> • 1 teacher training on flipped learning • 2 public seminars with sharing of flipped learning experts (posters and invitation letters were sent to all secondary schools in Hong Kong.) • 4 teacher development activities on flipped learning and using the learning and teaching materials: total 13 teacher development sessions for use of learning materials 	Fully achieved	
To develop learning and teaching materials for supporting student-centered learning	<ul style="list-style-type: none"> • A Community of Practice of Flipped Learning for ICT teachers (CoP) • 7 project meetings • 3 focus group interviews for reviewing learning materials 	Fully achieved	<ul style="list-style-type: none"> • 221 videos, 4 animations and 64 visualizers have been completed, well above the target of 183 videos, 4 animations and 55 visualizers. • PowerPoint notes and pre-class and in-class exercises were developed for supporting the use of the videos and visualizers.

2. Project Impact

2.1 The learning effectiveness and student-centered learning

At the end of the second term of AY 2018/19, students and teachers were asked to complete questionnaires on how they feel about the effectiveness of flipped learning.

Teacher perception survey

37 secondary school teachers who have used the flipped learning materials in the delivery of the Senior ICT Curriculum provided responses to the teacher perception questionnaire on flipped learning. The responses to the questionnaire are summarized in Table 2. The majority of respondents voted “Strongly Agree” and “Agree” for all questions of the questionnaire. 94.6% of respondents voted “Strongly Agree” and “Agree” for Question 17: “Overall speaking, Flipped Learning helps students in learning the ICT subject”.

The majority of respondents strongly agreed or agreed that there were improvements in pre-class activities, in-class activities, revision activities, students’ interest and motivation and understanding of the difficulties of students.

Table 2: Teacher Perception Survey

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Accessibility of Flipped Learning Materials					
1. The pre-class learning materials are accessible to students before class	18.9%	70.3%	10.8%	0%	0%
2. Students can control the pace and flow of learning by using the pre-class learning materials	21.6%	64.9%	13.5%	0%	0%
Strengthen knowledge by using Flipped Learning Materials					
3. The pre-class learning materials help students understand the base knowledge for in-class activities	24.3%	62.2%	13.5%	0%	0%
4. Flipped Learning materials are useful for revision by students	21.6%	62.2%	16.2%	0%	0%
Time for in-class activities by using Flipped Learning Materials					
5. With Flipped Learning, students have more time to practice in class	10.8%	54.1%	29.7%	5.4%	0%
6. With Flipped Learning, students have more time and chances to ask me questions or seek my assistance in class	8.1%	67.6%	21.6%	2.7%	0%
7. With Flipped Learning, students have more time and chances to discuss with classmates in class	8.1%	73.0%	18.9%	0%	0%

8. With Flipped Learning, students are more engaged in in-class activities	8.1%	51.4%	37.8%	2.7%	0%
Content arrangement by using Flipped Learning Materials					
9. With Flipped Learning, I have more time to provide assistance to individual students	8.1%	54.1%	37.8%	0%	0%
10. With Flipped Learning, more time is available for arranging higher-order thinking activities in class	8.1%	54.1%	37.8%	0%	0%
11. With Flipped Learning, I can adjust what will be done in class depending on the pre-class feedback	2.7%	73.0%	21.6%	2.7%	0%
Understanding by using Flipped Learning Materials					
12. With Flipped Learning, students understand abstract concepts better	10.8%	56.8%	32.4%	0%	0%
13. With Flipped Learning, I can better understand the difficulties of students	8.1%	51.4%	37.8%	2.7%	0%
Students' Interested by using Flipped Learning Materials					
14. With Flipped Learning, students are more motivated in learning the ICT subject	10.8%	45.9%	35.1%	8.1%	0%
15. With Flipped Learning, students learn the ICT subject better	10.8%	59.5%	27.0%	2.7%	0%
16. With Flipped Learning, students are more confident in learning the ICT subject	5.4%	45.9%	45.9%	2.7%	0%
Overall Rating of using Flipped Learning Materials					
17. Overall speaking, Flipped Learning helps students in learning the ICT subject	5.4%	89.2%	5.4%	0%	0%

Student perception survey

430 secondary school students who have used the flipped learning materials in learning the Senior ICT Curriculum provided responses to the student perception questionnaire on flipped learning. The responses to the questionnaire are summarized in Table 3. The majority of respondents voted “Strongly Agree” and “Agree” for all questions of the questionnaire. 68.6% of respondents voted “Strongly Agree” and “Agree” for Question 18: “Overall speaking, Flipped Learning helps my learning in the ICT subject”.

The majority of respondents strongly agreed or agreed that there were improvements in pre-class activities, in-class activities, revision activities, their interest, motivation and confidence in learning.

Table 3: Student Perception Survey

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Accessibility of Flipped Learning Materials					
1. I can access the pre-class learning materials before class	14.9%	58.9%	22.5%	2.6%	1.0%
2. I can access the pre-class learning materials easily	16.2%	56.5%	21.5%	5.0%	0.8%
Pre-Class Learning by using Flipped Learning Materials					
3. I regularly complete watching and reading pre-class learning materials before class	8.6%	40.5%	34.9%	13.3%	2.8%
4. I can control the pace and flow of learning by using the pre-class learning materials	10.0%	50.0%	30.5%	7.4%	2.1%
5. I regularly complete the pre-class exercises before class	10.7%	40.5%	31.6%	14.0%	3.3%
6. The pre-class learning materials help me understand the base knowledge for in-class activities	12.8%	55.8%	24.2%	5.6%	1.6%
Learning by using Flipped Learning Materials					
7. Flipped Learning gives me more time to think and understand the base knowledge for in-class activities in the pre-class period	11.6%	54.0%	28.1%	5.3%	0.9%
8. The Flipped Learning materials are useful for revision	15.1%	49.1%	27.9%	6.5%	1.4%
In-Class activity by using Flipped Learning Materials					
9. With Flipped Learning, I have more time to practice in class	12.8%	44.3%	31.7%	9.8%	1.4%
10. With Flipped Learning, I have more time and chances to ask questions or seek assistance from teacher in class	14.0%	45.3%	31.4%	7.4%	1.9%
11. With Flipped Learning, I have more time and chances to discuss with classmates in class	12.8%	48.1%	29.8%	7.7%	1.6%
12. With Flipped Learning, I am more engaged in in-class activities	12.8%	41.4%	35.3%	9.1%	1.4%
Students' motivation by using Flipped Learning Material					
13. I like using Flipped Learning materials for learning the ICT subject	14.9%	46.0%	30.2%	6.5%	2.3%
14. With Flipped Learning, I am more motivated in learning the ICT subject	13.5%	44.2%	30.2%	10.0%	2.1%
15. With Flipped Learning, I learn the ICT subject better	13.0%	46.7%	30.2%	7.4%	2.6%
Students' Interested by using Flipped Learning Materials					

16. With Flipped Learning, I am more confident in learning in the ICT subject	11.0%	47.4%	33.6%	5.6%	2.3%
17. With Flipped Learning, I found learning more interesting in the ICT subject	13.8%	43.9%	36.2%	4.0%	2.1%
Overall Rating of using Flipped Learning Materials					
18. Overall speaking, Flipped Learning helps my learning in the ICT subject	14.8%	53.8%	26.1%	4.2%	1.2%

Test scores on selected topics of flipped learning

A common quiz paper was designed for evaluation of the effectiveness of flipped learning. The common quiz consists of 40 multiple choice questions which cover selected topics of the Compulsory Part of the Senior Secondary ICT curriculum. The common quiz paper was used to measure the academic performance of students in the Control Group and the students in the Target Group. A participating secondary school chose the S5 ICT students of AY 2017/18 as the Control Group and the S5 ICT students of AY 2018/19 as the Target Group; or chose the S4 ICT students of AY 2017/18 as the Control Group and the S4 ICT students of AY 2018/19. Students in the Control Group were taught by Traditional Classroom. Students in the Target Group were taught by Flipped Learning. At the end of AY 2017/18, the performance of students in the Control Group was measured by using the common quiz paper. At the end of AY 2018/19, the performance of students in the Control Group was measured by using the common quiz paper. The results of the common quiz for the Control Group and Target Group are shown in Table 4.

Table 4: Results of Common Quiz

Control Group			Target Group		
No. of Students	Mean score	Standard Deviation	No. of Students	Mean score	Standard Deviation
464	19.76	6.38	444	20.84	7

The mean score of the Target Group is higher than that of the Control Group. However, there is no statistically significant difference between the mean scores of the Target Group and the Control Group ($p = 0.27$).

Self-directed learning skills scale

The self-directed learning skills scale (SDLSS), in a self-report questionnaire

were used to measure self-directed learning skills of students in the Target Group at the beginning and the end of AY 2018/19.

Table 5: Results of SDLSS of the Target Group (20191119)

Before Flipped Learning			After Flipped Learning		
No. of Respondents	Mean SDLSS score	Standard Deviation	No. of Respondents	Mean SDLSS score	Standard Deviation
495	132.16	15.58	379	132.56	17.29

The mean SDLSS score of the Target Group after Flipped Learning is higher than that of the Target Group before Flipped Learning. However, there is no statistically significant difference between the mean SDLSS scores of the Target Group before and after Flipped Learning ($p = 0.72$).

2.2 The professional development

60 secondary schools have participated in the Project. The project team has organized various teacher development activities for secondary school teachers, including public seminars, training session on flipped learning and focus group interviews. Experts were invited to provide training and experience sharing in flipped learning. Before applying flipped learning, a training session and a public seminar were provided to teacher on applying flipped learning in the delivery of the Senior Secondary ICT curriculum. Focus group interviews were organized for reviewing and supporting the implementation of Flipped Learning. In the focus group interviews, secondary school teachers shared their experiences, including tips and tricks, in Flipped Learning. In the Teacher Perception Survey on Flipped Learning, 94.3% of respondents voted “Strongly Agree” and “Agree” for the question: “Overall speaking, Flipped Learning helps students in learning the ICT subject”.

3. Cost-effectiveness

The direct beneficiaries were ICT teachers and students in participating schools (more than 60 teachers and 1200 students). The potential beneficiaries are all ICT teachers and students from secondary schools in Hong Kong. The Community of Practice will continue to promote and support flipped learning in secondary schools. After the completion of the project, the Information Technology Discipline will provide the free web hosting service of the learning materials for download by teachers. With understanding of flipped learning, ICT teachers can continue to fine-tune the learning materials and improve strategies of flipped learning.

Table 6: Budget Checklist

Budget Items (Based on Schedule II of Agreement)	Approved Budget (a)	Actual Expense (b)	Change [(b)-(a)]/(a) +/- %
Staff Cost	\$3,812,376	\$3,149,986.5	-17.4%
Equipment	\$37,104	\$37,045	-0.2%
Service	\$168,300	\$162,982.4	-3.2%
General Expenses	\$56,078	\$19,520	-65.2%
Contingency	\$7,842	\$0	-100%

4. Deliverables and Modes of Dissemination

Table 7: Dissemination Value of Project Deliverables

Item description (e.g. type, title, quantity, etc.)	Evaluation of the quality and dissemination value of the item	Dissemination activities conducted (e.g. mode, date, etc.) and responses	Is it worthwhile and feasible for the item to be widely disseminated by the QEF? If yes, please suggest the mode(s) of dissemination.
Flipped Learning Materials	221 videos, 4 animations, 64 visualizers, 209 PowerPoint notes and related exercise files have been developed for Flipped Learning.	<ul style="list-style-type: none"> 2 public seminars Teacher development activities 60 secondary schools have joined the Project 	NA
A Community of Practice of Flipped Learning for ICT teachers	The Community of Practice has organized seminars and teacher development activities for sharing of good practices and promotion of flipped learning.		NA
A website of Flipped Learning Materials	<ul style="list-style-type: none"> Teachers can download learning materials from the website. A teacher's guide to using the e-learning materials is available from the website. 	<ul style="list-style-type: none"> 2 public seminars 60 secondary schools have joined the Project 	NA

The IT Discipline has accumulated extensive experiences in the development of flipped learning materials, promotion of flipped learning and evaluation of flipped learning. The project has received very positive feedbacks from teachers and students. The project can be continued for promotion of flipped learning and in-depth evaluation of the effectiveness of flipped learning in terms of student's academic performance and self-directed learning skills.

5. Activity List

The project team has organized various activities for promotion of flipped learning to ICT teachers, establishment of the Community of Practice, sharing of flipped learning experiences and development and review of flipped learning materials. The activities can be found in Table 8.

Table 8: Activity List

Types of activities	Brief description	No. of participants		Feedback from participants
		schools	teachers	
Project Meeting for participating teachers	30/11/2017	25	25	Teachers provided feedbacks on the choices of languages of media, programming languages and tentative topics for development of learning materials.
Flipped learning training session for secondary school teachers	9/3/2018	17	17	In general, teachers were satisfied with the training session. They expressed that the training session helped them better understand flipped learning. Some teachers indicated that the visualizers were very useful. In the survey of the teacher perception on the training session, the respondents gave an average overall rating of 3.41 out of 5.
Project Meeting with representatives of secondary school teachers	26/3/2018	6	6	<ul style="list-style-type: none"> Teachers provided feedbacks and opinions on the pilot set of learning materials and agreed that the language of media should be mainly Chinese with English keywords and captions in demonstration videos. It was agreed that a common quiz paper would be used to measure the academic performance of the Control Group and Target Group.
Project Meeting with representatives of secondary school teachers	29/3/2018	6	7	<ul style="list-style-type: none"> Teachers provided feedbacks and opinions on the developed learning materials of the pilot set and agreed that language of media should be

				<p>mainly Chinese with English keywords and captions in demonstration videos.</p> <ul style="list-style-type: none"> It was agreed that a common quiz paper would be used to measure the academic performance of the Control Group and Target Group.
First Public Seminar on Flipped Learning in Senior Secondary ICT Curriculum	21/4/2018	48	57	<p>In general, teachers were satisfied with the public seminar and interested in flipped learning. They expressed that the seminar helped them better understand flipped learning. Some teachers showed their interests to join the project. In the survey of the teacher perception on the seminar, the respondents gave an average overall rating of 4.16 out of 5.</p>
5 teacher development sessions for use of learning material	21/4/2018	20	25	<p>In general, teachers were satisfied with the teacher development sessions. They were highly impressed with the learning materials. Some teachers showed their interests to join the project. 10 more secondary schools have joined the project after the development sessions. In the survey of the teacher perception on the teacher development sessions, the respondents gave an average overall rating of 4.48 out of 5.</p>
Project Meeting with representatives of secondary school teachers	2/5/2018	10	11	<ul style="list-style-type: none"> Teachers provided opinions and suggestions on the development of Set 1 learning materials. Teachers agreed to participate the pilot run of flipped learning. Arrangement of the common quiz for the students in the Control Group and Target Group was finalized.
Project Meeting with	5/6/2018	6	6	Teachers provided opinions on the

representatives of secondary school teachers				developed Set 1 learning materials. They expressed that they needed more time for the preparation of the pilot run of flipped learning. They agreed to complete the pilot run of flipped learning before the end of the academic year 2017/18.
Project Meeting with representatives of secondary school teachers	12/07/2018	8	9	Teachers provided opinions on the developed Set 1 learning materials.
Focus group interviews with teachers for reviewing the pilot set of learning and teaching materials	12/07/2018	8	9	Teachers provided opinions on the pilot set of learning materials. In general, the teachers provided positive comments on the learning materials.
5 teacher development sessions for use of learning material	01/09/2018	38	42	In general, teachers were satisfied with the teacher development sessions. They were highly impressed with the learning materials. Some teachers showed their interests to join the project. 8 more secondary schools have joined the project after the development sessions. In the survey of the teacher perception on the teacher development sessions, the respondents gave an average overall rating of 4.06 out of 5.
2 teacher development sessions for use of learning materials	10/01/2019	23	24	In general, teachers were satisfied with the teacher development sessions. In the survey of the teacher perception on the teacher development sessions, the respondents gave an average overall rating of 4.17 out of 5.
Focus group interviews with teachers for reviewing the 1st set of learning	10/01/2019	23	24	Teachers provided opinions on the 1 st set of learning materials. They also provided feedbacks and sharing on flipped learning. In general, the

and teaching materials				teachers provided positive comments on the learning materials.
Class Visit	14/05/2019	2	2	The project team observed the activities in classroom. The teacher provided feedbacks on the use of learning materials. In general, the teacher provided very positive comments on the learning materials.
Second Public Seminar on Flipped Learning in Senior Secondary ICT Curriculum	29/08/2019	32	34	In general, teachers were satisfied with the public seminar and teacher development sessions. 12 more secondary schools have joined the project after the seminar. In the survey of the teacher perception on the seminar and teacher development sessions, the respondents gave an average overall rating of 4.37 out of 5.
Teacher development session for use of learning materials	29/08/2019	32	34	
Focus group interviews with teachers for reviewing the 2nd set of learning and teaching materials	29/08/2019	3	3	Teachers provided feedbacks and sharing on the 2 nd set of flipped learning. In general, the teachers provided positive comments on the learning materials.

6. Difficulties Encountered and Solutions Adopted

The project was completed on time and within budget. There were no major difficulties encountered.

7. References

Yildizay Ayyildiz & Leman Tarhan (2015). Development of the self-directed learning skills scale, *International Journal of Lifelong Education*, 34:6, 663-679.