

## A novel cooperative education programme to approaching the *last mile*: an academic perspective

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**ABSTRACT:** A new approach of linking *topping teaching* practice in cooperative education with enterprises for vocational education is compared with the traditional approach of *sandwich teaching* practice from an academic perspective. *Topping teaching* is proposed for the appeal of the *last mile* approach, which aims at uniting the last difficult sections in academic education with business enterprises to enhance students' employability after graduation. A correlation analysis of the two teaching methods on the effectiveness of teaching goals was conducted. The differences between the *topping teaching* and *sandwich teaching* methods are characterised by identifying the significance of variance on each of the aspects. This survey investigation involved teaching staff at universities of technology and science in Taiwan as its subjects. It was revealed that teaching goals can be more attainable when the new method of *topping teaching* is utilised. This is attributed to the finding that most of the teaching factors are better enhanced by the *topping teaching* method than the *sandwich teaching* method in achieving the four teaching goals.

### INTRODUCTION

The concept of the *last mile*, as developed and highlighted by Wen, implies the reengineering of vocational education [1]. It is proposed that a new mechanism be put into linking the *last mile* distance offered at educational institutions with business enterprises; hence, higher entry-level employment can be obtained for students just after graduation. In brief, the practice programme in vocational education prepares students for employment, and this is implemented alternatively between schooling and enterprising businesses [2]. It provides a good platform for the integration of theory into practice in order to achieve the goal of *last mile*.

At present, the most popular cooperative education programme is a kind of alternative form of study at vocational schools and practice in enterprises, which is also called *sandwich teaching*. This has been facing many difficulties recently with rapidly changing technology and technological requirements in the world.

In particular, the graduate student's capabilities is incongruent with the requirements of enterprises. Students become little more than a cheap labour supply in enterprises while they are engaged in practice. Therefore, a novel *topping teaching* method is proposed in comparison with that of the contemporary *sandwich teaching* to solve such problems and purposefully attain the goal of the *last mile* [3]. Furthermore, it is intended that a programmed curriculum design will also be issued next year that applies the concepts of the *topping teaching* method [4].

The objective of *topping teaching* is proposed to promote graduate student employment by solving discrepancies between the worlds of academy and industry. To design effectively a curriculum that can facilitate *topping teaching* requires the involvement of both industry and academia [5].

The author has previously created and defined the concepts of *topping teaching* and examined the industry perspective on the design of a *topping teaching* curriculum [6][7]. Therefore, the purpose of this study is to look at the academic perspective on *topping teaching* curriculum design so that an integrated curriculum model of *topping teaching* can be effectively designed. In this new cooperative education programme, the curriculum design and implementation are modified to enhance graduate student employability and thus satisfy the needs of enterprises. In order to find out the significance and efficiency of *topping teaching*, a comparison is made between the *topping teaching* programme with the traditional *sandwich teaching* programme from an academic perspective.

### LITERATURE REVIEW

#### Implied Meaning of the *Last Mile*

The *last mile* originally meant *the final and most difficult part in building up the telecommunication network from the control room to the end user*. It has been quoted as the *last mile* project by Taiwan's Ministry of Education to promote cooperation between schools and enterprises. In such a case, the schooling curriculum is emphatically designed to integrate enterprises into the last academic year of vocational education. Its purpose is to enhance the employment capabilities of graduate students. A common suspicion of enterprises about the validity or applicability of school rankings is yet another barrier that needs to be overcome to accomplish the goal of the *last mile* [3]. Obviously, by the specific requirements and difficulties cited, the curriculum design in the *last mile* project is – and must be – different from traditional practice methods.

#### The Traditional *Sandwich Teaching* Practice Method

It is believed that the *sandwich teaching* approach was originally conceived in Scotland around 1880 and introduced in

England in 1903 as the earliest system of academia-industry collaboration [8]. This approach was extensively accepted as the cooperative education model by higher vocational education bodies all over the world after World War II [9]. This education system allows learning in colleges and practice rotation, that is to say, students spend some time studying in colleges and some time undertaking practice in the relevant industry (work placement experience) until graduation. The details of curriculum design or implementation might be varied a little in different countries [10]. Fundamentally, it is implemented in an alternative manner between one semester of schooling and one semester of practice in enterprises for a comprehensive integration of theory [11]. The purpose is to enhance the professional skills of students by offering them a chance to practice the pertinent theories.

The *sandwich teaching* practice method was first introduced in Taiwan by Lee in imitation of the Swiss Hotel schooling system and is currently implemented in the fundamental way as described above [12]. Sometimes, it is called the *alternative teaching* practice method as well to accomplish the goal of *learning in work and also work in learning* [13]. That is, the theory taught in vocational schools can be comprehended immediately in onsite practice. Furthermore, the objectives of *sandwich teaching* can be summarised from previous reports [12][14][15].

These objectives are as follows:

- *To verify theory in practice*: most of the courses in schooling are fundamental and theoretical. The application of theory is hardly practiced in vocational schooling; as a result, students cannot obtain practical skills. However, *sandwich teaching* provides students with onsite practice to verify the theory that have learnt in school;
- *To enhance employment opportunities*: students in onsite practice are evaluated in working ethics, skills and potentials. Those who display good performances give a direct impression to employers, thereby enhancing their chances of employment after graduation;
- *To promote interpersonal relationships*: the social relationships of students are quite simple and limited if in contact with only classmates and teachers. Onsite practice opens up the chance for more social activities and promotes students' interpersonal relationships;
- *To save on educational costs*: technology is changing very rapidly around the world. However, school facilities are insufficiently updated due to limited budgets. Cooperative education with enterprise provides a good opportunity to practice and update expensive equipment. Hence, the school benefits in saving on costs.

The Needs for a New Practice Programme: *Topping Teaching*

Using food as an analogy, the term *topping* is derived from the final additives put on the top of a pizza. In this context, *topping* is used to differentiate itself from the intermediate meaning implied from *sandwiching* [3]. *Topping teaching* first appeared in the report titled *Programmed Curriculum and Topping Teaching Design*, which was presented at the conference *Modular Curriculum and Topping Course* held at Shu-Te University in Taiwan in April 2004. Professionals from industry were invited to take part in designing the contents of various courses. The *topping teaching* concept was further discussed in a university development and cooperative

education conference held at Yun-Lin University of Science and Technology in October 2004 and has been accepted for publishing in an international journal [3][6].

The *last mile* appeals for the need to change the current practice programmes in vocational schooling to meet industry requirements. Therefore, the curriculum must be designed by both the school and enterprises together. The requirements of enterprises must be taken into consideration. Besides, practice programmes must be implemented in the manner of *topping teaching*. This kind of practice method is regarded as the probationary training of recruiting new staff. It provides the employer with a better opportunity to evaluate students in practice.

Furthermore, the personality of students just before graduation can be well developed and the practice conducted in the last whole academic year provides students with a strong motivation to participate in practice work because of the need for employment [13]. Students are consequently serious in learning and the employer becomes more active in the training practice [9]. Those students who behave excellently in practice have higher chances of obtaining employment. Significantly, this system is seen to allay or remove *suspicion* of school rankings and reduces its impact on students at vocational schools [3].

The purposes of *topping teaching* and *sandwich teaching* are basically the same: to integrate theory and practice [4]. The *sandwich teaching* method emerged as a result of the need to enhance students' understanding of theory towards application. However, the *topping teaching* method is proposed to meet the occupational requirements of business enterprises. It is also proposed to obtain higher entry-level employment for students from vocational schools, who suffer from employer suspicion of school rankings.

Comparison between *Topping Teaching* and *Sandwich Teaching*

The *topping teaching* and the *sandwich teaching* methods hold the same goals, but are somewhat different with regard to strategies and implementation. The authors herewith summarise their previous reports to compare the two teaching methods on several teaching factors [3][4]. These factors include those detailed in Table 1. specifically:

- Curriculum design;
- Practice mechanism;
- Student motivation;
- Personal relationships; etc.

The teaching factors listed in Table 1 are defined as follows:

- The curriculum design is defined in two operations: one is programmed by the school and enterprises together, and the other is designed by the school exclusively;
- The practice schedule is defined in two operations: one involves lessons in one semester and practice in the next semester, while the other operation is the coordination of a course with theory and application in the first semester of the last academic year and then onsite practice in an enterprise in the next semester;
- The practice mechanism is defined in two operations: one is to meet occupational needs and the other is to enhance the comprehension of the theory;

Table 1: A comparison between *topping teaching* and *sandwich teaching*.

Goals	Teaching Factor	Methods	
		<i>Sandwich Teaching</i>	<i>Topping Teaching</i>
Verification of theory in practice	Curriculum design	Fundamental courses only; lack of practical ones	Fundamental courses first, then programmed ones by enterprises
	Practice schedule	One semester of practice and one semester of schooling in an academic year repeatedly	Students participate in practice in the last semester and accept related lessons in advance
	Practice mechanism	To enhance theory towards its application	To meet the occupational needs of enterprises
Enhancement of employment opportunities	Student motivation	Low	High because of the high chance to obtain employment
	Occupational concept	Become cheap labour	Become probationary trainees
Personal relationships	With classmates	Not well-developed	Well-developed
	With customers	Not mature in social contact	More mature in dealing with customers
Educational cost saving		Cost saving is easily affected by the industry moving abroad	Recognise the fact of industry moving abroad; strategic alliances with enterprises are enhanced

- The student's motivation is defined in two operations: one is where students prepare seriously for employment, while in the other one, students are more lackadaisical;
- Personal relationships are defined in two operations: one is well-developed and the other is not;
- The occupational concept is defined in two operations: one is to easily become a cheap labour supply without the consciousness of employment, and the other converts it into probationary training;
- The customer relationship is defined in two operations: one is active due to the high opportunity of employment, while the other is not.

## RESEARCH METHOD

### Research Structure

From the results of the literature review, there are seven main differences between the *topping teaching* and *sandwich teaching* methods. These are used to identify the relationship of how these factors are used to achieve the goal of the *last mile*. Hence, an analysis of the teaching efficiency with regard to goal achievement is structured and shown in Figure 1.

### Hypotheses

According to the research structure, the following hypotheses have been derived for further verification from the academic perspective. It briefly verifies the significance of the two dimensions' teaching programmes concerning the seven teaching factors on achieving the teaching goal.

1. Hypothesis 1: A significant variance exists between the *topping teaching* and *sandwich teaching* methods with regard to the teaching factors:
  - 1.1 A significant variance between the *topping teaching* and *sandwich teaching* methods exists concerning curriculum design;
  - 1.2 A significant variance exists between the *topping teaching* and *sandwich teaching* methods regarding the practice schedule;
  - 1.3 A significant variance exists between the *topping teaching* and *sandwich teaching* methods regarding the practice mechanism;

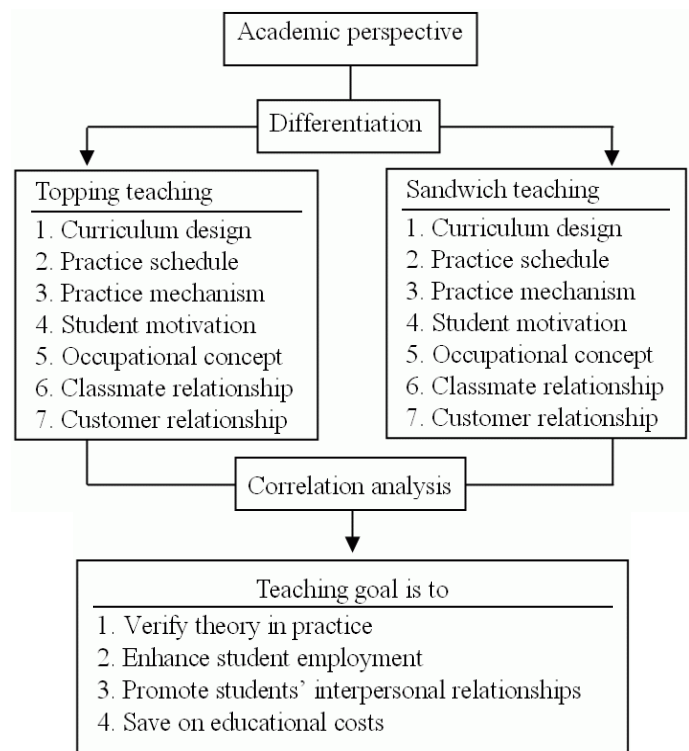


Figure 1: The research structure.

- 1.4 A significant variance exists between the *topping teaching* and *sandwich teaching* methods concerning students' motivation;
- 1.5 A significant variance exists between the *topping teaching* and *sandwich teaching* methods regarding the occupational concept;
- 1.6 A significant variance exists between the *topping teaching* and *sandwich teaching* methods concerning classmate relationship;
- 1.7 A significant variance exists between the *topping teaching* and *sandwich teaching* methods regarding customer relationships.
2. Hypothesis 2: A significant variance exists between the teaching factors of the *topping teaching* and *sandwich teaching* methods with regards to achieving the teaching goals:

- 2.1 A significant variance exists between the *topping teaching* and *sandwich teaching* methods concerning the goal to verify theory in practice;
  - 2.2 A significant variance exists between the *topping teaching* and *sandwich teaching* methods regarding the goal to enhance student's employment opportunities;
  - 2.3 A significant variance exists between the *topping teaching* and *sandwich teaching* methods with regard to the goal to promote students' interpersonal relationships;
  - 2.4 A significant variance exists between the *topping teaching* and *sandwich teaching* methods concerning the goal to save on educational costs.
3. Hypothesis 3: A significant variance exists between the different teacher attributes required for the two teaching programmes:
- 3.1 A significant variance between teachers' ages exists with regard to the *topping teaching* and *sandwich teaching* methods' efficiency;
  - 3.2 A significant variance between teachers' work positions exists with regard to the *topping teaching* and *sandwich teaching* methods' efficiency;
  - 3.3 A significant variance between teachers' levels of experience in cooperative education exists with regard to the *topping teaching* and *sandwich teaching* methods' efficiency.

## QUESTIONNAIRE DESIGN

### Description

The four teaching goals and seven teaching factors were summarised from previous reports and recognised in an interview with enterprises in cooperation with Shu-Te University. Likert-type five-point scales were used in the questionnaire design. The five grades included *very high*, *high*, *medium*, *low* and *very low*; these were marked as five, four, three, two and one, respectively.

### Pre-Results of the Questionnaire

Due to a limited budget, the questionnaire was pre-tested in the southern area of Taiwan only. It was suggested to have a minimum of 20 observers in a pre-test and there were 30 observers in this pre-test [16]. The questionnaire was modified to some extent according to the opinions of the observers.

The final questionnaire was designed to encompass the following four parts:

- Integration of theory and work: 12 questions;
- Employment opportunity enhancement: 12 questions;
- Personal relationships: 16 questions;
- Educational cost savings: 12 questions.

There were 52 questions in the questionnaire. The data were analysed to obtain a Cronbach's  $\alpha$  value of 0.84 using SPSS statistical packaged software. Theoretically, a minimum 0.7 for the  $\alpha$  value is required for a validity test. Hence, the questionnaire met the requirements for high validity.

The study was conducted with teachers at vocational schools from the middle of November 2005 to the end of January 2006.

One questionnaire was tested in each individual department of the schools. A total 312 questionnaires were sent out and 175 of them were returned. The return ratio of valid questionnaires was 56%.

### Data Analysis

In order to achieve the research goal, the data was analysed by statistical description, a t-test of the variables and analysis of variance (ANOVA).

## RESULTS AND DISCUSSION

### T-Test for Comparing the *Topping Teaching* and *Sandwich Teaching* Methods

The hypotheses listed under Hypothesis 1 were verified with regard to the significance of the two teaching programmes and the seven teaching factors. This is shown in Table 2 with results elaborated on below.

Hypothesis 1.1: the variance between the *topping teaching* and *sandwich teaching* methods on curriculum design was found to be significant ( $t(174) 13, n, s$ ). The average score of *topping teaching* (2.77) was higher than that for *sandwich teaching* (2.14). It was revealed that *topping teaching* is better than *sandwich teaching* to achieve the teaching goal by way of a modified curriculum design.

Hypothesis 1.2: the variance between the *topping teaching* and *sandwich teaching* methods on practice schedule was found to be significant ( $t(174) 16.024, n, s$ ). The average score of *topping teaching* (2.92) was higher than that for *sandwich teaching* (2.09). It was shown that the teaching goal is much more attainable for *topping teaching* than for *sandwich teaching*.

Hypothesis 1.3: the variance between the *topping teaching* and *sandwich teaching* methods concerning the practice mechanism was found to be not significant ( $t(174) 1.88, n, s$ ). It is probably the case that higher employment can also be accomplished with the verification of theory in practice by the practice mechanism of *topping teaching*.

Hypothesis 1.4: the variance between the *topping teaching* and *sandwich teaching* methods on students' motivation levels was determined to be significant ( $t(174) 5.246, n, s$ ). The average score of *topping teaching* (2.54) was a little higher than that for *sandwich teaching* (2.32). It is believed that *topping teaching* is better in achieving the teaching goal by enhancing students' motivation.

Hypothesis 1.5: the variance between the *topping teaching* and *sandwich teaching* methods concerning the occupational concept was found to be significant ( $t(174) 23.3, n, s$ ). The average score of *topping teaching* (3.13) was much higher than that for *sandwich teaching* (1.88). Therefore, it is believed that *topping teaching* can enhance much more the occupational concept of the student in practice than *sandwich teaching* does in achieving the teaching goal.

Hypothesis 1.6: the variance between the *topping teaching* and *sandwich teaching* methods on classmate relationships was determined to be significant ( $t(174) -2.346, n, s$ ). This can probably be attributed to the fact that classmate relationships are not affected much by *topping teaching* than *sandwich teaching* to achieve the teaching goal.

Table 2: T-test results on comparison between *topping teaching* and *sandwich teaching*.

Teaching Factor	Teaching Method	Sample no.	Average	T value	P value
Curriculum design	<i>Topping teaching</i>	175	2.77	13.00	0.000***
	<i>Sandwich teaching</i>	175	2.14		
Practice schedule	<i>Topping teaching</i>	175	2.92	16.02	0.000***
	<i>Sandwich teaching</i>	175	2.09		
Practice mechanism	<i>Topping teaching</i>	175	2.57	1.88	0.062
	<i>Sandwich teaching</i>	175	2.54		
Student motivation	<i>Topping teaching</i>	175	2.54	5.246	0.020**
	<i>Sandwich teaching</i>	175	2.32		
Occupational concept	<i>Topping teaching</i>	175	3.13	23.3	0.000***
	<i>Sandwich teaching</i>	175	1.88		
Classmate relationship	<i>Topping teaching</i>	175	2.78	-2.346	0.000***
	<i>Sandwich teaching</i>	175	2.63		
Customer relationship	<i>Topping teaching</i>	175	2.79	13.05	0.000***
	<i>Sandwich teaching</i>	175	2.26		

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

Hypothesis 1.7: the variance between the *topping teaching* and *sandwich teaching* methods concerning customer relationships was deemed to be significant ( $t(174) 13.05, n, s$ ). The average score of *topping teaching* (2.79) was higher than that for *sandwich teaching* (2.26). That is, *topping teaching* enhances customer relationships much more than *sandwich teaching* does with respect to achieving the teaching goal.

Generally, it was positively recognised that the occupational concept of students was particularly enhanced by *topping teaching* for further effective training in practice. The *sandwich teaching* method was to be found only helpful regarding classmate relationships and became negative for students involved in practice due to the lack of the occupational concept.

#### Correlation Analysis of the Teaching Method on the Teaching Goal

The hypotheses listed under Hypothesis 2 were verified and are shown in Table 3 regarding the significance of the two teaching programmes on achieving the teaching goal from the academic perspective. t-test calculations were also performed on the pair of *topping teaching* and *sandwich teaching* concepts on the four teaching goals utilising the SPSS software.

As shown in Table 3, the variance between the *topping teaching* and *sandwich teaching* methods was found to be significant with regard to the four teaching goals, including verification theory in practice, enhancement of student's employment opportunities, the promotion of student interpersonal relationships and educational cost savings.

Table 3: Correlation analysis results of the two teaching methods on the teaching goals.

Teaching Goal	Teaching Method	Sample no.	Average	T value	P value
Verification theory in practice	<i>Topping teaching</i>	175	2.99	19.727	0.000***
	<i>Sandwich teaching</i>	175	1.93		
Enhancement of employment	<i>Topping teaching</i>	175	3.01	19.076	0.000***
	<i>Sandwich teaching</i>	175	1.978		
Personal relationships	<i>Topping teaching</i>	175	2.92	16.766	0.000***
	<i>Sandwich teaching</i>	175	2.24		
Educational cost saving	<i>Topping teaching</i>	175	2.80	-8.062	0.000***
	<i>Sandwich teaching</i>	175	2.36		

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

It has been demonstrated that the teaching goals can indeed be accomplished by using the *topping teaching* process to a greater extent as compared to the traditional *sandwich teaching* practice method.

Regarding all the aspects of the teaching goals and teaching factors, the average scores of the *topping teaching* method were much higher than those for *sandwich teaching*. It can be concluded that the teaching goals can be more attainable by using approach of the new *topping teaching* practice method to realise cooperative education with enterprises. This is attributed to the enhancement of teaching factors by the *topping teaching* practice method for a better achievement of the teaching goals as a consequence.

#### ANOVA of Personal Attributes

##### Age Attributes between the *Topping Teaching* and *Sandwich Teaching* Methods

The age composition of the participants and their proportion in the sample of 175 valid responses were as follows:

- 50 teachers aged between 30 and 39 accounted for 28.6%;
- 87 teachers between the age of 40 to 49 accounted for 49.7%;
- 36 teachers in their 50s accounted for 20.6%;
- 2 teachers above 60 years of age accounted for 1.1%.

By the analysis of one-way ANOVA, there is a significant variance of teacher age attribute on *sandwich teaching* and *topping teaching*.

Table 4 shows that the highest score was obtained for *topping teaching* for teachers aged between 40 and 49. This is probably because teachers in that age range have higher expectations concerning student employment in general.

#### Experience Attributes between the *Topping Teaching* and *Sandwich Teaching* Methods

The composition of the teachers' experience and their proportion in the sample of 175 valid responses were as follows:

- 46 teachers had experience in *sandwich teaching* and accounted for 26.3%;
- 88 teachers without any practice teaching experience accounted for 50.3%;
- 41 teachers had experience in practice teaching in a summer course.

A t-test was conducted to verify if there was a significant variance in teachers' experience levels attributed to practice teaching of cooperative education with regard to the *topping teaching* and *sandwich teaching* methods. No significant variance in teaching experience was attributed to either teaching methods (see in Table 5).

In general, from an academic perspective, the practice teaching of cooperative education has been well-recognised and

comprehended by most teachers, and it has nothing to do with whether the teacher is experienced in the practice teaching of cooperative education or not. However, the average score of *topping teaching* was much higher than that for *sandwich teaching* for teachers with or without practice teaching experience in cooperative education. This can be attributed to the fact that *topping teaching* holds higher expectations than the traditional *sandwich teaching* and it has gained more interest for most of the teachers.

#### Working Position Attribute between the *Topping Teaching* and *Sandwich Teaching* Methods

The composition of the subjects' work position and their proportion in the sample of 175 valid responses were as follows:

- 25 lecturers accounted for 14.3%;
- 38 assistant professors accounted for 21.7%;
- 95 associate professors accounted for 54.3%;
- 17 professors accounted for 9.7%.

Table 6 shows that the average ANOVA results for the *topping teaching* method scored by the teachers from all of these four different working positions were higher than the results scored for the *sandwich teaching* method. It is also shown in Table 6 that associate professors have a better level of comprehension of *topping teaching*.

Table 4: ANOVA results of the teacher's age attribute on the teaching factors.

Category	Group by age	Sample no.	Average	Deviation	F value	P value
<i>Topping teaching</i>	30-39	50	2.68	0.96	5.48	0.001**
	40-49	87	2.87	0.34		
	50-59	36	2.83	0.65		
	60 and above	2	2.08	0.71		
<i>Sandwich teaching</i>	30-39	50	2.22	0.28	4.17	0.007**
	40-49	87	2.25	0.32		
	50-59	36	2.24	0.28		
	60 and above	2	1.33	-0.9		

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

Table 5: ANOVA results of the teacher's experience attribute on the teaching factors.

Category	Group by Experience	Sample No.	Average	F Value	P Value
<i>Topping teaching</i>	<i>Sandwich teaching</i> experience	46	2.85	0.237	0.096
	Practice teaching in a summer course	41	2.87		
	No experience	88	2.74		
<i>Sandwich teaching</i>	<i>Sandwich teaching</i> experience	46	2.26	0.232	0.793
	Practice teaching in a summer course	41	2.21		
	No experience	88	2.22		

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

Table 6: ANOVA results of the teacher's working position attribute on the teaching factors.

Category	Group	Sample No.	Average	F Value	P Value
<i>Topping teaching</i>	Lecture	25	2.69	8.45	0.00***
	Assistant professor	38	2.80		
	Associate professor	95	2.86		
	Professor	17	2.60		
<i>Sandwich teaching</i>	Lecture	25	2.14	1.68	0.18
	Assistant professor	38	2.16		
	Associate professor	95	2.27		
	Professor	17	2.16		

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

## CONCLUSIONS

Under the current circumstances of rapidly changing technology, it has become more and more difficult for graduate students to obtain employment due to the disconnection of that learnt in theory and that actually required in practice at enterprises. Therefore, the novel *topping teaching* method is compared in this article with the traditional *sandwich teaching* method in order to solve such considerable discrepancies between academic institutions and enterprises. One of them is the common suspicion about the school's ranking as a barrier that needs to be overcome so as to accomplish the teaching goal of the *last mile*, which implies the final and most difficult part of the teaching goals is to enhance graduate students' level of employability.

The difference between the *topping teaching* and *sandwich teaching* methods are characterised by the teaching factors and identifying the significance of variance for each aspect. The survey was investigated from an academic perspective on the teaching faculty at universities of science and technology in southern Taiwan.

This report reveals that teaching goals can be more attainable by the approach of the new *topping teaching* practice method for cooperative education with enterprises from the academic perspective. The teaching goals include the verification of theory in practice, the enhancement of student' employment opportunities, the promotion of student interpersonal relationships and educational cost savings.

Seven teaching factors have been developed in the research structure, including the curriculum design, practice schedule, practice mechanism, student motivation, occupational concept, classmate relationship and customer relationship. It has been found that most of the teaching factors are better enhanced through the *topping teaching* method than for the traditional *sandwich teaching* process to achieve the four teaching goals.

The influence of teacher attributes on the two teaching methods is also presented in this article.

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