Developing Professional Development (PD) for Vocational Teachers based on the OBE Framework, its Effect on Trainees' Learning Motivation and Training Satisfaction

Fan Wang [iD] **, Chowwalit Chookhampaeng**[*] [iD] **, Jiraporn Chano** [iD]
Faculty of Education, Mahasarakham University,
Mahasarakham 44000, Thailand

Abstract. Professional Development (PD) for teachers plays a significant role in nurturing new skills, extending updated knowledge and promoting educational reform. The concept of Outcome-Based Education (OBE) is highly recognised in the field of education as it matches the student-centred claim and emphasises measurable learning outcomes. In order to improve the training effectiveness and stimulate vocational teachers' learning motivation, authors in this research developed a PD for vocational teachers according to the design process and learning outcomes of the OBE concept. Trainees' learning motivation is measured through the questionnaire based on Kirkpatrick's model of training evaluation and the ARCS Model of motivation. A total of 40 secondary vocational teachers and 40 higher vocational teachers from Guangdong, China were enrolled in this research. The analysis of quantitative data was conducted using paired samples *t*-test and one-sample *t*-test to evaluate trainees' motivation and satisfaction throughout the PD. The findings of this research suggest that the PD design based on the OBE framework has a significant impact on trainees' learning motivation and training satisfaction according to the comparison of the data collected from trainees before and after attending the PD.

Keywords: learning motivation; outcome-based education; teacher's professional development; training satisfaction; vocational education

1. Introduction
Professional development (PD) for teachers has gained increasing significance on a global scale. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) introduced a framework titled the "International

[*] Corresponding author: *Chowwalit Chookhampaeng; choochowwalit@hotmail.com*

Standard Classification of Teacher Training Programmes" in 2021, which was designed for the collection, coding and analysis of internationally comparable statistics related to teacher PD and the qualifications of different educators. Education International published "The Global Report on the Status of Teachers 2021" to discuss the status of teachers during the COVID-19 pandemic, which emphasised that the improvement of teachers' status also involved the support of PD and teacher training from different jurisdictions. Cambridge Partnership for Education published a report in 2021, which argues that PD has the potential to significantly improve teachers' essential skills in the modern era, extending beyond the mere imparting of subject knowledge. This includes equipping them with the capacity for constructing knowledge systems.

However, UNESCO also identified some of the challenges of PD, including insufficient training duration, limited training opportunities, inadequate training funding, and deficient information technology (IT) proficiency, which hinder successful implementation of PD in certain regions. Meanwhile, there are no specific published standards to evaluate PD's quality and effectiveness (Loyalka et al., 2019). PD design also emphasises organiser-centred concept (Darling-Hammond, 2008; Ingersoll & Strong, 2011; Penuel & Gallagher, 2017), which means trainees' actual needs may be overlooked. In addition, the COVID-19 pandemic also promotes the changes in training organisation modes, training methods and evaluation and among others (Pozo-Rico et al., 2020; Zhang et al., 2020).

Vocational education is a form of education, which is career-oriented and develops learners' specific knowledge, skills and abilities related to particular positions or fields (UNESCO, 2021). In 2022, UNESCO released the "Draft Strategy for Technical and Vocational Education and Training (TVET) (2022-2029): Transforming TVET for Successful and Just Transitions". This document underscores the needs of global transitions in the new era for vocational education and training to foster skills that enable all individuals to learn, work and live, develop skills for inclusive and sustainable economies, and cultivate skills for inclusive and peaceful societies. Meanwhile, the State Council of the People's Republic of China published "National Implementation Plan for Vocational Education Reform" in 2019, which promotes "three education reform[1]" to each vocational school. The Ministry of Education of the People's Republic of China and the Ministry of Finance of the People's Republic of China published "Vocational Teachers' Quality Improvement Plan (2021-2025)", which emphasises vocational teachers in the new era need to equip with professional skills that align with the latest industry standards and possess teaching capabilities capable to promoting "three education reform". Hence, the global industry transition necessitates higher quality and advanced educational and training resources, especially in nurturing high-quality and high-level teams of vocational teachers.

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[1] Notes:

"three education reform" means the educational reform of vocational schools, which emphasises three core factors in the vocational school: teaching materials, teaching methods and teachers.

2. Literature review
Outcome-based education (OBE)
Outcome-Based Education (OBE) is a learner-centred and performance-oriented pedagogical approach (Mokgaphame, 2001; Spady, 1994; Yasmin & Yasmeen, 2021). In the PD process, PD organisers act as a facilitator to empower trainees to cultivate the competencies they anticipate through the creation and maintenance of a conducive learning environment. Hence, OBE offers a powerful and promising pathway for the transformation and management of PD.

OBE also emphasises the introduction of a clear picture of what participants can do, and then uses these learning outcomes as a foundation for constructing relevant curriculum and activities (Deneen et al., 2013; Morcke et al., 2013; Spady, 1994). Therefore, learning outcomes are significant in endowing learners with observable and measurable objectives in the OBE education process (Spady, 1994; Abd Majid, 2016; Senaratne and Gunarathne, 2019), which can significantly stimulate learners' motivation (Akhmadeeva et al., 2013; Kusurkar et al., 2012; Spady, 1994) and performance (Camello, 2014; Macayan, 2017; Pradhan, 2021).

According to Korthagen (2017), PD design needs to consider trainees' thoughts, feelings, wants and learning motivation for the programme, which can construct connections with trainees, influence the trainees' behaviour during the PD process, and even improve the effectiveness of PD. Besides, effective PD design should encompass content-centred, sufficient training duration, interactive group learning, the stimulation of learning enthusiasm, and continuous guidance and learning (Desimone and Stuckey, 2014; Hubers et al., 2022; Mouza et al., 2022). Hence, the characteristics of PD design grounded in the OBE framework can perfectly align with some of the requirements mentioned above.

PD design based on OBE framework
Loucks-Horsley et al. (2009) describe the PD design process as follows (see Figure 1). With the investigation of the disparity between the current situation and expectations of PD participants, guided by vision and standards, PD design formulates appropriate objectives for improvement. Meanwhile, PD participants are willing to engage in the PD design to improve themselves. Analysis of student learning and other data are also the influencing factors for objectives setting in the PD design, especially connected with the learning context. Additionally, anticipating critical issues during the goal-setting phase are essential to ensure the effective implementation of PD. After that, employing multiple strategies simultaneously should be considered to achieve the goals of PD design.
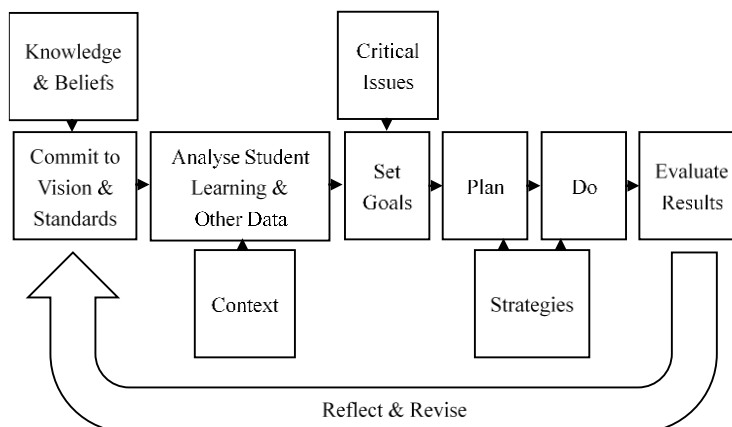
Figure 1: Professional Development Design Framework (Loucks-Horsley et al., 2009)

As for PD design based on the OBE framework for vocational teachers, PD design process is implemented as follows (see Figure 2). Compared with the PD design framework mentioned above, this research aims to emphasise bringing the results phase to the forefront of PD design process, the intended learning outcomes that trainees can achieve when they finish the PD and revolving around the detailed learning outcomes to design appropriate assessment activities. Simultaneously, the design of training content and related activities should also be geared towards facilitating the achievement of learning outcomes. Finally but not the least, the learning outcomes in PD design will continuously improve until they align with the participants' capabilities at their utmost potential.
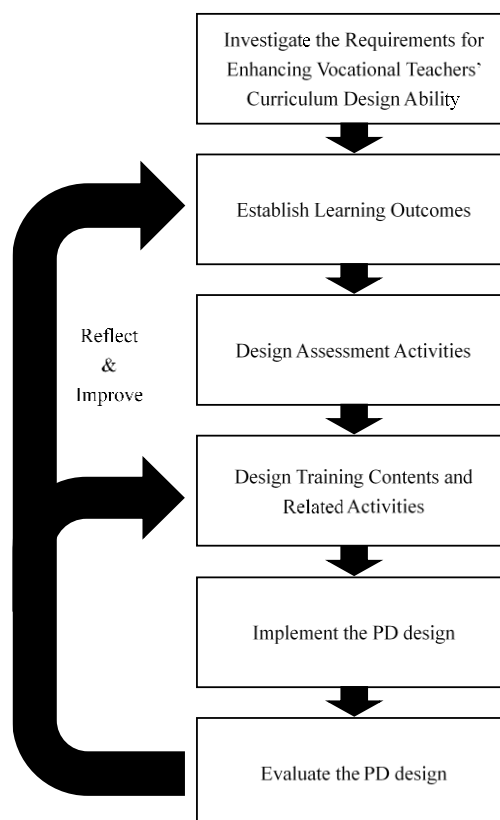

Figure 2: PD Design Process for Vocational Teachers Based on the OBE Framework

The ARCS model

The ARCS model is a method that Keller (1984) developed to increase the motivational appeal of instructional materials. It combines four dimensions (Attention, Relevance, Confidence and Satisfaction) to describe how people become and remain motivated: (1) Attention is a prerequisite for learning, which emphasises learners getting and maintaining attention during the learning process; (2) Relevance emphasises concentrating on learners' needs, interests and motives; (3) Confidence emphasises enhancing learners' belief on achieving success by themselves; and (4) Satisfaction emphasises promoting learners' efforts through the provision of both extrinsic and intrinsic reinforcement. This research leverages the ARCS model in questionnaire design to record the change in trainees' learning motivation level before and after attending the training workshop.

Kirkpatrick's model

Kirkpatrick's model is a training evaluation method developed in 1959 and it defines four levels (Reaction, Learning, Behaviour and Results) to evaluate the efficacy of training design (Kirkpatrick, 1959). Kirkpatrick (2015) defines each level as follows: (1) The first level (Reaction) emphasises the degree to which participants find the training design has enough attraction and can meet their needs; (2) The second level (Learning) emphasises the degree to which participants can acquire the intended knowledge, skills and attitudes through the training; (3) The third level (Behaviour) emphasises the degree to which participants apply the training contents into their work when they return to the workplace; and (4) The fourth level (Results) emphasises the degree to which participants have achieved training objectives after training and following support. This research adopts the level 1 (Reaction) measurement method in Kirkpatrick's model in questionnaire design to evaluate trainees' training satisfaction after they have completed the PD.

4. Methodology

In this empirical research, a PD programme was implemented to enhance vocational teachers' curriculum design ability; for example, to evaluate the efficacy of a PD design based on the OBE framework. The PD was conducted over a period of one month and consisted of two groups: 40 secondary vocational teachers and 40 higher vocational teachers from Guangdong Province, China.

The learning outcomes in this empirical research are divided into four modules, aligning with the demands and the present state of curriculum design ability among vocational teachers: needs analysis, instructional improvement, student assessment and pedagogical reflection. Before trainees attend the PD, the PD organiser informs them about specific learning outcomes they expect to achieve upon completing the PD: (1) Trainees can apply the requirements of policy documents and social needs in curriculum design; (2) Trainees can formulate teaching objectives according to students' learning needs; (3) Trainees can implement curriculums based on the concept of Gagne's 9 Events of Instruction; (4) Trainees can measure their students' learning performance with appropriate

methods; and (5) Trainees demonstrate awareness of the importance of reflection after class.

Satisfaction and learning motivation serve as crucial indicators for evaluating the performance of learners (Hong et al., 2019; Kirkpatrick, 1967; Li & Keller, 2018; Medina, 2017; Moreira et al., 2019). Consequently, the questionnaire design in this research uses the ARCS model to measure trainees' learning motivation before and after the introduction of PD design and employs the level 1 (Reaction) measurement method in Kirkpatrick's model to evaluate trainees' satisfaction after participating in the PD.

The learning motivation questionnaire and the training satisfaction questionnaire employ a five-point Likert Scale, where scores range from 1 to 5, representing trainees' attitudes from the lowest to the highest. Secondary vocational education and higher vocational education are different stages of vocational education: secondary vocational education emphasises constructing the basic knowledge framework of vocational education and higher vocational education emphasises extending the latest technologies and knowledge of related industries (Maclean & Pavlova, 2013). As the teaching objectives differ for secondary vocational teachers and higher vocational teachers, the questionnaire data analysis is divided into two groups: secondary and higher vocational teachers' groups. Although both vocational teachers' groups achieve the same learning outcomes in teacher PD, the detailed training contents and activities will be different.

Before and after introducing the learning outcomes and training framework, trainees' learning motivation is investigated and compared through a paired samples t-test. The learning motivation questionnaire is designed to assess trainees' expectations of the PD, PD's relevance for vocational teachers' curriculum design ability, trainees' recognition of the PD framework and the trainees' feelings about the PD arrangement. Upon completion of the PD, trainees' satisfaction is assessed and results are analysed through a one-sample *t*-test. The training satisfaction questionnaire is designed to evaluate trainees' achievement of both expectations and learning outcomes, the trainees' willingness to transfer training contents into practice, the trainees' satisfaction with the PD, and the trainees' adaptation to the training contents and activities.

To ensure data effectiveness, 20 participants were randomly selected in each group to fill out the questionnaire. With the analysis of SPSS statistical software, the Cronbach's alphas of the learning motivation questionnaire and the training satisfaction questionnaire are 0.740 and 0.896, the KMO measure of sampling adequacy of the learning motivation questionnaire and the training satisfaction questionnaire are 0.658 and 0.815, and the Bartlett's test of sphericity of the learning motivation questionnaire and the training satisfaction questionnaire are 96.280 and 238.774, respectively, both sig. levels are 0.000. Furthermore, the factor analysis without rotated solution of the learning motivation questionnaire and the training satisfaction questionnaire both extract two components, which can explain 62.149% and 73.265% of the total variance respectively. Hence, the

learning motivation questionnaire and the training satisfaction questionnaire have acceptable validity and reliability.

The research hypotheses are presented as follows:
Hypothesis 1: The PD design based on the OBE framework enhances both secondary vocational teachers' and higher vocational teachers' learning motivation in comparison to their motivation levels before the introduction of the learning outcomes and training framework.

Hypothesis 2: The PD design based on the OBE framework increases both secondary vocational teachers' and higher vocational teachers' satisfaction when they finish the PD.

5. Results

To assess hypothesis 1, 80 questionnaires were distributed on the PD learning motivation before and after the accomplishment of PD programme on curriculum design for the secondary and higher vocational teacher groups. The research questions can be summarised under Keller's four dimensions: A (Attention), R (Relevance), C (Confidence) and S (Satisfaction), assessed using a five-point Likert Scale (1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree).

To confirm the effects of OBE-based PD design on secondary vocational teachers, a paired samples *t*-test was adopted to compare and analyse their learning motivation levels before and after attending the PD programme.

H_0: The learning motivation of the secondary vocational teachers remains unchanged following the introduction to the learning outcomes and training framework, as compared to their motivation levels before the programme.

H_1: The learning motivation of the secondary vocational teachers is improved following the introduction to the learning outcomes and training framework, as compared to their motivation levels before the programme.

As depicted in Table 1, feedback across the four dimensions indicates that within the secondary vocational teachers' group, learning motivation increased following the PD programme, with average levels rising by 16%-19%. According to the results of the paired samples t-test in Table 2, the p-value of each question is less than 0.05, indicating that there is a significant improvement in the feedback on learning motivation from secondary vocational teachers following their participation in the PD programme and the null hypothesis H_0 is rejected.

Table 1. Group Statistics of Secondary Vocational Teachers' Learning Motivation before and after the PD programme

Dimensions	Questions	Situation	N	Mean	Improvement Rate	SD
Attention	To what extent do you agree that you are willing to attend this PD?	Before	40	2.33	19%	0.971
		After	40	2.78		0.800
	To what extent do you agree that the learning outcomes listed in the PD notice could attract you to attend this PD design?	Before	40	2.93	19%	1.299
		After	40	3.50		0.564
Relevance	To what extent do you agree that this PD programme matched your expectations?	Before	40	3.18	16%	0.903
		After	40	3.70		0.516
	To what extent do you agree that the learning outcomes outlined in this PD programme fit your expectations?	Before	40	3.28	16%	0.751
		After	40	3.80		0.464
Confidence	To what extent do you agree that this PD programme assisted you in solving the problems in your daily curriculum design?	Before	40	3.23	17%	0.620
		After	40	3.78		0.423
Confidence	To what extent do you agree that you could achieve the learning outcomes specified in this PD design?	Before	40	3.18	18%	0.903
		After	40	3.75		0.588
Satisfaction	To what extent do you agree that this PD programme is useful for you?	Before	40	3.05	17%	0.846
		After	40	3.58		0.636

Table 2. Paired Samples *t*-Test on Secondary Vocational Teachers' Learning Motivation before and after the PD introduction

Dimensions	Pairs	Questions	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
Attention	Pair 1	To what extent do you agree that you are willing to attend this PD?	-4.767	39	.000	-.641	-.259
	Pair 2	To what extent do you agree that the learning outcomes listed in the PD notice could attract you to attend this PD programme?	-4.658	39	.000	-.825	-.325
Relevance	Pair 3	To what extent do you agree that this PD programme could match your expectations?	-6.565	39	.000	-.687	-.363
	Pair 4	To what extent do you agree that the learning outcomes outlined in this PD programme could fit your expectations?	-6.565	39	.000	-.687	-.363
Confidence	Pair 5	To what extent do you agree that this PD programme	-6.904	39	.000	-.711	-.389

Dimensions	Pairs	Questions	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
		could assist you in solving the problems in your daily curriculum design?					
	Pair 6	To what extent do you agree that you could achieve the learning outcomes specified in this PD programme?	-7.264	39	.000	-.735	-.415
Satisfaction	Pair 7	To what extent do you agree that this PD programme is useful for you?	-6.565	39	.000	-.687	-.363

To confirm the effects of OBE-based PD programme on curriculum design on the higher vocational teachers, a paired samples t-test is also employed to compare and analyse their learning motivation levels before and after attending the PD programme.

H_0: The learning motivation of the higher vocational teachers remains unchanged following the introduction to the learning outcomes and training framework, as compared to their motivation levels before the programme.

H_1: The learning motivation of the higher vocational teachers is improved following the introduction to the learning outcomes and training framework compared to their motivation levels before the programme.

As depicted in Table 3, feedback across the four dimensions indicates that within the higher vocational teachers' group, learning motivation increased following the PD programme, with average levels rising by 16%-20%. According to the results of the paired samples t-test in Table 4, the p-value of each question is less than 0.05, suggesting that there is a significant improvement in the feedback on learning motivation from higher vocational teachers following their participation in the PD programme and the null hypothesis H_0 is rejected.

Table 3. Group Statistics of Higher Vocational Teachers' Learning Motivation before and after the PD introduction

Dimensions	Questions	Situation	N	Mean	Improvement Rate	Std. Deviation
Attention	To what extent do you agree that you are willing to attend this PD?	Before	40	2.58	20%	0.903
		After	40	3.10		0.744
	To what extent do you agree that the learning outcomes listed in the PD notice could attract you to attend this PD programme?	Before	40	2.83	19%	1.196
		After	40	3.35		0.622
Relevance	To what extent do you agree that this PD design could	Before	40	3.05	16%	1.011
		After	40	3.55		0.504

Dimensions	Questions	Situation	N	Mean	Improvement Rate	Std. Deviation
	match your expectations?					
Relevance	To what extent do you agree that the learning outcomes outlined in this PD programme fit your expectations?	Before	40	3.20	16%	0.992
		After	40	3.70		0.464
Confidence	To what extent do you agree that this PD programme could assist you in solving the problems in your daily curriculum design?	Before	40	2.85	18%	1.167
		After	40	3.35		0.483
	To what extent do you agree that you could achieve the learning outcomes specified in this PD programme?	Before	40	2.80	19%	0.823
		After	40	3.33		0.474
Satisfaction	To what extent do you agree that this PD programmeis useful for you?	Before	40	3.03	17%	0.698
		After	40	3.55		0.552

Table 4. Paired Samples *t*-Test on Higher Vocational Teachers' Learning Motivation before and after the PD introduction

Dimensions	Pairs	Questions	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
Attention	Pair 1	To what extent do you agree that you are willing to attend this PD?	-4.069	39	.000	-.786	-.264
	Pair 2	To what extent do you agree that the learning outcomes listed in the PD notice could attract you to attend this PD design?	-2.933	39	.006	-.887	-.163
Relevance	Pair 3	To what extent do you agree that this PD programme could match your expectations?	-2.793	39	.008	-.862	-.138
	Pair 4	To what extent do you agree that the learning outcomes outlined in this PD programme fit your expectations?	-2.912	39	.006	-.847	-.153
Confidence	Pair 5 Pair 6	To what extent do you agree that this PD programme assisted you in solving the problems in your daily curriculum design?	-2.469	39	.018	-.910	-.090

Dimensions	Pairs	Questions	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
Satisfaction	Pair 7	To what extent do you agree that you could achieve the learning outcomes specified in this PD programme?	-4.640	39	.000	-.754	-.296
		To what extent do you agree that this PD programme is useful for you?	-5.547	39	.000	-.716	-.334

To assess hypothesis 2, a satisfaction assessment questionnaire was received after completing the PD programme and 80 questionnaires were collected in two groups. The questionnaire used a five-point Likert Scale (1=Very Dissatisfied, 2=Dissatisfied, 3=Unsure, 4=Satisfied, 5=Very Satisfied) to assess satisfaction levels.

To assess the potential correlation between the PD programme based on the OBE framework and trainees' satisfaction within the secondary vocational teacher group, one-sample t-test was adopted to analyse their satisfaction levels after attending the PD. Besides, a test value of 4 (i.e., 4=Satisfy) for analysis was selected to evaluate the effects on satisfaction levels.

H_0: $\mu=4$
H_1: $\mu\neq4$

The results in Table 6 revealed that the p-value of the satisfaction levels in each question within the secondary vocational teacher group were all less than 0.05, which rejects the null hypothesis. As indicated in Table 5, the average satisfaction level in each question exceeded 4, with the 95% satisfaction level falling within the range from 4.22 to 4.71. Consequently, the PD programme based on the OBE framework significantly enhanced training satisfaction in the secondary vocational teacher group.

Table 5. Group Statistics of Secondary Vocational Teachers' Training Satisfaction after Attending the PD

Questions	N	Mean	Std. Deviation
To what extent are you satisfied with the overall design of PD?	40	4.64	0.570
To what extent are you satisfied with the overall curriculum design programme in PD?	40	4.71	0.458
To what extent do you agree that attending this PD programme is useful when you return to work?	40	4.67	0.477
To what extent do you agree that attending this PD programme could solve your problems in your curriculum design process?	40	4.42	0.657
To what extent do you agree that the content in this PD programme could be easily integrated into your curriculum design?	40	4.40	0.654

To what extent do you agree that the content in this PD programme could help enhance the quality of your curriculum design?	40	4.42	0.657
To what extent do you agree that the content in this PD programme could help boost your students' learning motivation?	40	4.38	0.716
To what extent do you are willing to adopt or refer to the contents of this PD programme in your curriculum design?	40	4.22	0.517

Table 6. One-Sample *t*-Test on Secondary Vocational Teachers' Training Satisfaction after Attending the PD

Questions	Test Value = 4				
	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
				Lower	Upper
To what extent are you satisfied with the overall design of the PD?	7.580	39	0.000	0.47	0.82
To what extent are you satisfied with the overall curriculum design programme in PD?	10.407	39	0.000	0.57	0.85
To what extent do you agree that attending this PD programme is useful when you return to work?	9.381	39	0.000	0.52	0.81
To what extent do you agree that attending this PD programme could solve your problems in your curriculum design process?	4.313	39	0.000	0.22	0.62
To what extent do you agree that the content in this PD programme could be easily integrated into your curriculum design?	4.105	39	0.000	0.20	0.60
To what extent do you agree that the content in this PD programme could help enhance the quality of your curriculum design?	4.313	39	0.000	0.22	0.62
To what extent do you agree that the content in this PD programme could help boost your students' learning motivation?	3.538	39	0.001	0.16	0.59
To what extent do you are willing to adopt or refer to the contents of this PD programme in your curriculum design?	2.881	39	0.006	0.07	0.38

To assess the potential correlation between the PD design based on the OBE framework and trainees' satisfaction within the higher vocational teacher group, one-sample t-test was conducted to analyse their satisfaction levels after attending

the PD. In addition, the same test value (i.e., 4=Satisfy) was selected for analysis to assess the effects on satisfaction levels in the secondary vocational teacher group.

H_0: $\mu=4$
H_1: $\mu\neq4$

The results in Table 8 reveal that the p-value of the satisfaction levels in each question within the higher vocational teacher group were all less than 0.05, which rejects the null hypothesis. As indicated in Table 7, the average satisfaction level in each question exceeded 4, with the 95% satisfaction levels falling within the range from 4.09 to 4.69. Consequently, the PD programme based on the OBE framework significantly enhanced training satisfaction in the higher vocational teacher group.

Table 7. Group Statistics of Higher Vocational Teachers' Training Satisfaction after Attending the PD

Questions	N	Mean	Std. Deviation
To what extent are you satisfied with the overall design of PD?	40	4.62	0.535
To what extent are you satisfied with the overall curriculum design in PD?	40	4.62	0.490
To what extent do you agree that attending this PD programme is useful when you return to work?	40	4.69	0.468
To what extent do you agree that attending this PD programme could solve your problems in your curriculum design process?	40	4.49	0.549
To what extent do you agree that the content in this PD programme could be easily integrated into your curriculum design?	40	4.47	0.588
To what extent do you agree that the content in this PD programme could help enhance the quality of your curriculum design?	40	4.56	0.546
To what extent do you agree that the content in this PD programme could help boost your students' learning motivation?	40	4.38	0.650
To what extent do you are willing to adopt or refer to the contents of this PD programme in your curriculum design?	40	4.09	0.288

Table 8. One-Sample *t*-Test on Higher Vocational Teachers' Training Satisfaction after Attending the PD

	Test Value = 4				
Questions	***t***	**df**	**Sig. (2-tailed)**	**95% Confidence Interval of the Difference**	
				Lower	**Upper**
To what extent are you satisfied with the overall design of PD?	7.807	39	0.000	0.46	0.78
To what extent are you satisfied with the overall curriculum design in PD?	8.513	39	0.000	0.47	0.77
To what extent do you agree that attending this PD programme is useful when you return to work?	9.871	39	0.000	0.55	0.83
To what extent do you agree that attending this PD programme could solve your problems in your curriculum design process?	5.978	39	0.000	0.32	0.65
To what extent do you agree that the content in this PD programme could be easily integrated into your curriculum design?	5.326	39	0.000	0.29	0.64
To what extent do you agree that the content in this PD programme could help enhance the quality of your curriculum design?	6.827	39	0.000	0.39	0.72
To what extent do you agree that the content in this PD programme could help boost your students' learning motivation?	3.900	39	0.000	0.18	0.57
To what extent do you are willing to adopt or refer to the contents of this PD programme in your curriculum design?	2.072	39	0.044	0.00	0.18

6. Discussion

According to the analysis of pre-training and post-training questionnaires from both secondary and higher vocational teachers, several important findings can be obtained in the PD programme based on the OBE framework.

The PD design of this research incorporates effective PD design factors identified in previous studies (Desimone & Stuckey, 2014; Hubers et al., 2022; Mouza et al., 2022; Yurtseven et al., 2020; Zhang et al., 2021;). The PD design in this research followed the OBE principles, emphasising student-centred, learning outcomes-oriented and continual improvement (Deneen et al., 2013; Morcke et al., 2013; Spady, 1994).

The PD programme based on the OBE framework effectively enhanced the learning motivation. As the PD programme in this research particularly offers a comprehensive overview of the knowledge and competencies trainees can acquire and apply post-training, the learning motivation of both secondary and higher vocational teachers was significantly enhanced across all four dimensions (See Table 1 to Table 4). Interestingly, in the attention dimension, an increase of nearly 19% can be seen in both groups, representing the most substantial improvement among all dimensions.

The OBE-based PD programme effectively increases the training satisfaction of vocational teachers. As the PD programme in this research emphasised trainee-centred concept, revolving around trainees' feedback to adjust training contents and methods accordingly, both secondary and higher vocational teachers highly validate the PD design based on the OBE framework (See Table 5 to Table 8), especially regarding curriculum design and ultimate learning outcomes design.

Although the results of this research show the improvement of trainees' learning motivation and training satisfaction among vocational teachers throughout training, it is essential to delve into specific indexes for a more comprehensive analysis. The improvement rate of the relevance dimension in learning motivation research was lower than those of other dimensions in both secondary and higher vocational teacher groups. This suggests that each trainee may have other expectations that the design of the programme cannot match. Furthermore, the mean score for Question 8, indicating the willingness to transfer training contents into practice, is the lowest in both secondary and higher vocational teacher groups, as shown in Table 6 and Table 8, indicating that each trainee may require ongoing support or follow-up to encourage the implementation of learning outcomes.

Table 9. The Improvement of Secondary Vocational Teachers' Learning Motivation Before and After the PD Programme in Four Dimensions

Dimensions	Pre-test	Post-test	Improvement quantities	Improvement rate
Attention	2.755	3.24	0.485	19%
Relevance	3.23	3.775	0.545	16%
Confidence	3.205	3.765	0.56	17%
Satisfaction	3.05	3.58	0.53	17%

Table 10. The Improvement of Higher Vocational Teachers' Learning Motivation Before and After the PD Programme in Four Dimensions

Dimensions	Pre-test	Post-test	Improvement quantities	Improvement rate
Attention	2.705	3.225	0.52	19%
Relevance	3.125	3.625	0.5	16%
Confidence	2.825	3.34	0.515	18%
Satisfaction	3	3.5	0.5	17%

7. Conclusion

In this research, the PD programme based on the OBE framework had a significant impact on learning motivation and training satisfaction of vocational teachers and confirmed the advancement of the OBE framework in PD design, which emphasises trainee-centred, learning outcomes-oriented and persistent improvement (Deneen et al., 2013; Morcke et al., 2013; Spady, 1994). These characteristics are consistent with the findings from previous studies on the effective factors influencing PD implementation (Desimone & Stuckey, 2014; Hubers et al., 2022; Mouza et al., 2022; Yurtseven et al., 2020; Zhang et al., 2021).

Four dimensions (i.e., Attention, Relevance, Confidence and Satisfaction) were assessed in learning motivation before and after attending the PD proramme in both secondary and higher vocational teacher groups, confirming that the OBE framework can be adopted in the PD programme for vocational teachers. After attending the PD programme, trainees' learning motivation significantly improved due to the provision of attainable and measurable learning outcomes tailored from the pre-training needs survey conducted with the trainees. Meanwhile, the PD programme revolved around learning outcomes to review design training content and continually improve training arrangements based on trainees' feedback, which promotes positive reflection on trainees' satisfaction.

Although this research assesses only trainees' learning motivation and training satisfaction, the PD programme based on the OBE framework still had a beneficial impact on trainees' learning behaviours, training models and training assessment methods and among others.

In conclusion, there is a large amount of research that has adopted the OBE framework in curriculum design around the world with great success, but the research on PD programmes based on the OBE framework has not been fully explored. The findings of this research aim to contribute to the exploration of the OBE framework's application in teacher professional development.

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Appendix 1
Questionnaire Design for Trainees' Learning Motivation
Part I Trainees' information
1. Name:

2. Gender
☐ Male
☐ Female

3. Diploma
☐ Higher Diploma
☐ Bachelor's degree
☐ Master's degree
☐ Doctoral degree

4. Position:

5. Professional qualification:

6. Subject to teach:

7. Instructional Experience
☐ 1-3 years
☐ 4-6 years
☐ 7-15 years
☐ 16-25 years
☐ More than 25 years

Part II Status of trainees' curriculum design ability
1. To what extent do you agree that you are willing to attend this PD?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

2. To what extent do you agree that the learning outcomes listed in the PD notice could attract you to attend this PD design?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

3. To what extent do you agree that this Pd programme could match your expectations?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

4. To what extent do you agree that the learning outcomes outlined in this Pd
programme could fit your expectations?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

5. To what extent do you agree that this Pd programme could assist you in solving the
problems in your daily curriculum design?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

6. To what extent do you agree that you could achieve the learning outcomes specified in
this Pd programme?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

7.To what extent do you agree that this Pd programme is useful for you?
☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree

Appendix 2
Questionnaire Design for Training Satisfaction
Part I Trainees' information
1. Name:

Part II Evaluation of teacher professional development design based on the OBE framework

1. To what extent are you satisfied with the overall design of PD?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

2. To what extent are you satisfied with the overall curriculum design in PD?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

3. To what extent do you agree that attending this Pd programme is useful when you return to work?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

4. To what extent do you agree that attending this Pd programme could solve your problems in your curriculum design process?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

5. To what extent do you agree that the content in this Pd programme could be easily integrated into your curriculum design?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

6. To what extent do you agree that the content in this Pd programme could help enhance the quality of your curriculum design?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

7. To what extent do you agree that the content in this Pd programme could help boost your students' learning motivation?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied

8. To what extent do you are willing to adopt or refer to the contents of this Pd programme in your curriculum design?
☐ Very satisfied
☐ Satisfied
☐ Unsure
☐ Dissatisfied
☐ Very dissatisfied