

Exploring the Interplay between Work Engagement, Self-Preparation, and Adaptability among Novice Teachers in Chinese Vocational Colleges

Jian-Hong Ye ^{1,2}, Yi-Sang Lee ³, Li Wang ⁴, Weiguaju Nong ^{5*}, Jhen-Ni Ye ⁶

¹ Faculty of Education, Beijing Normal University, Beijing 100875, China

² National Institute of Vocational Education, Beijing Normal University, Beijing 100875, China

³ Department of Industrial Education, National Taiwan Normal University, Taipei City 106, Taiwan

⁴ Dean's Office, Hainan Vocational University of Science and Technology, Hainan, China

⁵ School of Education, Guangxi University of Foreign Languages, Nanning 530222, China

⁶ Graduate Institute of Technological & Vocational Education, National Taipei University of Technology, Taipei City 106344, Taiwan

weiguaju.nong@hotmail.com (corresponding author)

Abstract. The construction of the vocational education system is an important educational development goal in China. Teachers are considered as a key factor affecting the quality of education. The early stage of a teacher's career development plays a significant role in transforming a novice teacher into an excellent teacher. Therefore, the purpose of this study was to explore the relationship among work engagement, self-preparation and adaptability of novice teachers in Chinese vocational colleges. This study recruited novice teachers from Chinese vocational colleges including higher vocational colleges and undergraduate vocational programs in universities to participate in the research. A total of 433 valid questionnaires were collected, including 199 male teachers (46%) and 234 female teachers (54%). Furthermore, based on the engagement theory, this study proposed seven research hypotheses and constructed a research model. Through the analysis of SPSS and AMOS, the study results showed that: 1. Three types of work engagement have positive effects on novice teachers' self-preparation and career adaptability; and 2. Teachers' self-preparation has a positive effect on career adaptability. According to the results, work engagement is an important factor in the early stage of career development for novice teachers. This study helped novice teachers to understand how to adapt to teaching work more effectively through different types of work engagement and teachers' working conditions through models based on engagement theory when they first start teaching.

Keywords: Adaptability; Higher Vocation Education; Novice Teacher; Preparation; Vocational College; Work Engagement

1. Introduction

Vocational education plays an important part in the social and economic development of countries (regions) around the world since ancient times. Vocational education nowadays is still one of the mainstream forms of training to fulfill society's need for skilled talents. It is a widespread goal to strengthen vocational education to satisfy the needs of human resources required by the labor market (Mahmut, 2020). Hence, it is very important to empower the ability of vocational education teachers at all levels (Serafini, 2018). Previous literature stated that the professional development of teachers in vocational education schools is closely relevant to students' development, learning experience, employment outcomes, and the effectiveness of institution operation. As a result, the professional development of teachers in the vocational system is essential to the quality of vocational education outcomes (Tran & Pasura, 2018, 2021).

A key sustainable development goal of vocational education is to enhance teacher capacity in the vocational education system, develop facilitation skills to enhance teaching practice, and keep abreast of the latest industry trends in curriculum development (Ahmed & Sayed, 2021). Teachers in the vocational education system need to integrate their knowledge, technology and professional practice (Zhao & Xue, 2022). The dual occupational roles of teachers as educators and industry experts are common in the vocational education academia and policy-making practices, which also makes the ideal image of high-quality and independent vocational educational professionals more complex and demanding (Alamsyah et al., 2022).

However, novice teachers face numerous daunting tasks after obtaining their teaching positions (Clark, 2012), because various challenges and difficulties arise when they try to develop and progress in their teaching career (Gholam, 2018). Novice teachers are often shocked by the practice reality, as they are not aware of the gap between teaching practice in real life and what was learned at university (Jin et al., 2023). Therefore, it is necessary for novice teachers to be aware of their relevant preparations in the early stage of teaching.

Current research on novice teachers focuses more on job dilemmas (Clark, 2012), reflection on teaching practice (Lefebvre et al., in press), teacher professional development programs (Jin et al., 2023), resignation and retention (Whalen et al., 2019), and job fit (Kaub et al., 2016), with many studies targeting teachers in the K-12 education stage. Most current research on teacher preparation focuses on pre-service teachers or discussion of the training plan in the pre-employment stage. There are relatively few studies which take novice teachers for other educational levels as the main topic. The literature on novice teachers in vocational colleges is quite scarce. There are still many challenges faced by novice teachers at the beginning of their teaching career. Most of the teachers in vocational colleges come from professional industries and have not necessarily received professional teacher education or training, so they may not have had teaching practice experience before becoming teachers, which is very different from teachers in the K-12 education stage. Therefore, in view of the importance of the development of vocational teachers, this study took novice vocational college teachers as the study subjects.

In their working environment, teachers are required to face a wide range of new, changing, or uncertain situations and events. Therefore, work preparation was urged to be set up into the school curriculum, especially on the basic program of teaching and learning (Nawi et al., 2015). When teachers are under-prepared, it leads to teaching inefficiency and negatively affects teachers' productivity and willingness to stay in the classroom, thereby hindering classroom teaching in the future (Farinde-Wu & Griffen, 2019). However, past research has found that novice teachers are often underprepared for the myriad challenges in the classroom, particularly when it comes to classroom management, with just over half of novice teachers reporting feeling well prepared (Goldhaber, 2019). Thus, teachers may be better prepared for the job if they have evidence-based research to refer to how to properly behave while teaching (Goldhaber, 2019). As a result, teachers' self-preparation is used as one of the constructs in this study, so as to understand the adaptation of novice teachers to the initial stage of their working life.

Career adaptability is a core concept in the management of one's career (Xiao et al., 2021) and also a ability needed for people to deal with changes and development in their current or future career with new job responsibilities (Eryilmaz & Kara, 2018). Career adaptability was considered as being able to cope with obstacles encountered in the career (Sahin & Kirdök, 2018). Therefore, career adaptability is regarded as one of the important factors in predicting the sustainable development of individuals in the future (Kara et al., 2022; Wen et al., 2022), and also the core aspect of occupational psychology and career construction theory (CCT) (Savickas, 2005). Lyckander (in press) suggested that the prior experience of teachers preparing for teacher practice in vocational schools could be investigated. Therefore, this study took career adaptability as one of the variables in the research model.

The previous literature points out that understanding engagement at work is affirmative for teachers as it is for other professions (Runhaar et al., 2013). Engagement is considered a specific psychological state that is positive, fulfilling, and work-related (Graça et al., 2021). Engagement is an overall term that integrates a teacher's level of attention, interest, and willingness to plan a set of skills, strategies, or activities to achieve performance improvements (Jiang et al., 2021). Therefore, work engagement is a core indicator that reflects the quality of teachers' professional life and student development (Jin et al., 2022). Dedicated (work-engaged) teachers are important for the following reasons: First, the previous research results show that the more teachers devote input to their work, the better students will perform and be ready for the future; secondly, if teachers are more engaged, they will be less willing to quit their jobs (Runhaar et al., 2013). Hence, promoting teachers' work engagement to improve the quality of education is a key issue in educational theory and practice (Jin et al., 2022). Thus, teacher engagement has attracted increasing attention in recent years. Although growing evidence supports the role of teachers' engagement in student learning outcomes, extant work has met the limitations of lack of clarity in theoretical and empirical models (Perera et al., 2018), because relevant research on work engagement has been influenced by different work-related stress models which focus on harmful results that occupational stressors have on one's health, both physical and mental (Mäkinen, 2013). Past research on the topic of engagement has primarily focused on the domain of behavioral engagement, comparing with fewer studies involving affective and cognitive engagement (Miller et al., 2020). Therefore, exploring the impact on teachers' self-preparation and adaptability from the perspective of multi-dimensional work engagement would help to expand the influence of work engagement on novice teachers.

Fredricks et al. (2004) proposed that engagement has multi-dimensional characteristics which can be categorized according to three independent dimensions: behavioral, cognitive and emotional engagement, and each of them occurs along a continuum from low to high. Rather than being a momentary specific state, engagement is an ongoing, pervasive affective cognitive state focused on a certain object, event, person, or behavior (Moreira-Fontán et al., 2019). With the growing recognition that inputs are a multidimensional construct, it is very significant to verify more systematically whether different dimensions of engagement share the same determinants or lead to the same outcomes (Janosz, 2012).

To sum up, China has the largest vocational education system in the world and continues to increase investment in the construction of vocational education system. Teachers are the significant prerequisite for the development of vocational education, and novice teaching is a critical period for cultivating excellent teachers. Therefore, this confirmatory study based on a cross-sectional design explored the influence of novice teachers' work engagement on their self-preparation and adaptability, and the relationship between job engagement, teachers' self-preparation and teacher adaptability in vocational colleges based on the engagement theory.

2. Theoretical Framework and Research Hypotheses

2.1. Engagement Theory

From a scholarly perspective, engagement is conceptualized as a subjective state of individuals that varies as a reflection of different activities and interactions with different individuals. These different perspectives partly reflect people's various goal performances (Fredricks et al., 2014). How inputs are conceptualized, defined, and measured varies among various studies (Vivante & Vedder-Weiss, 2022). The broadest conceptualization of engagement derives from the research in school settings, where engagement is considered as multidimensional dimensions including behavioral, emotional, and cognitive engagement (Fredricks et al., 2014), which is often distinguished from doing and thinking and related to sensation (Eccles, 2016).

Engaged people perceive their work as important and meaningful, and experience a sense of pride while performing work-related activities. Eventually, engaged people dedicate cognitive resources to work-related tasks, and stay focused (Perera et al., 2018). However, existing research on the role of these factors remains inconclusive, as they are often based on engagement as an overall characteristic, meaning that engagement is a level assessment of overall engagement typical of a school (Pöysä et al., 2021). Thus, all dimensions of engagement are viewed on a continuum from negative to positive (Miller et al., 2020). To sum up, this study adopted the engagement theory as the theoretical basis to explore the degree of work engagement of novice teachers in vocational colleges for the preparation and adaptation of teachers' early career development.

2.2. Research Model

Teacher work engagement is conceptualized as the teacher's current level of practice (Borup et al., 2014). Using the framework of engagement theory (Fredricks et al., 2004), the current study proposed seven research hypotheses and developed a research model to examine the three different forms of work engagement that have an influence on teachers' adaptability, namely behavioral, emotional, and cognitive engagement, as shown in Figure 1.

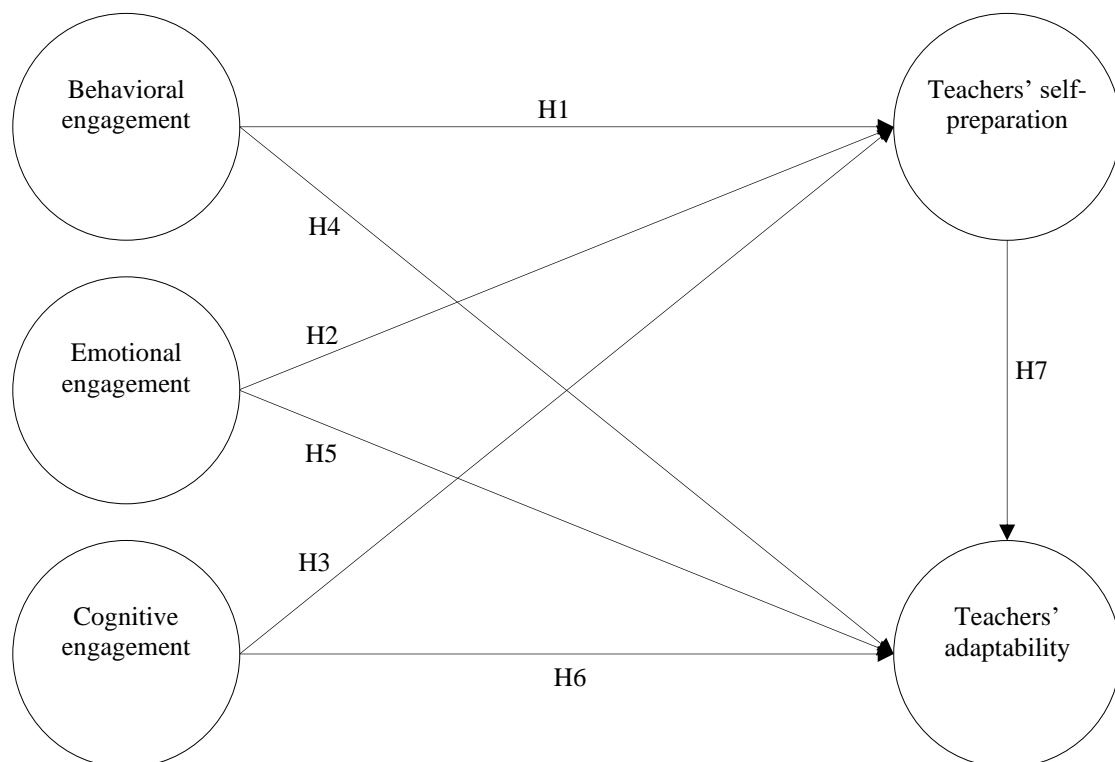


Fig. 1: Research Model

2.3. Research Hypotheses

2.3.1. The relationship between work engagement and teachers' self-preparation

Work engagement is originally conceptualized in terms of individuals, specifically employees' cognitive, emotional, and behavioral engagement in the task performance of their roles (Xiao et al., 2022); engagement therefore has multidimensional properties. According to Fredricks and Simpkins' definition (2013), engagement is the degree of commitment and investment of learners and educators to an activity or task. Interim behavioral engagement is easiest to assess because it refers to observable behavior of participation (Ritoša et al., 2020). Thus, behavioral engagement is the degree to which teachers actually act on their work assignments. In addition, emotional engagement refers to the teacher's positive emotional response to his/her work, and cognitive engagement refers to the degree to which the teacher focuses on the task (Perera et al., 2018).

People with higher levels of work engagement have many advantages (Zeng et al., 2019), because work engagement is a sense of professional commitment (Han & Wang, 2021). Since work engagement is a variable in positive psychology, it can promote personal development as a positive element of the workplace (Greenier et al., 2021), given that work engagement is characterized by energy and a strong sense of job identification (Zis et al., 2016). Therefore, teachers may be better prepared for their teaching work and for better performance. Based on the above, this study adopted work engagement to explore the relationship between participants and teachers' self-preparation. The hypotheses are as follows:

H1: Behavioral engagement has a positive effect on teachers' self-preparation.

H3: Emotional engagement has a positive impact on teachers' self-preparation.

H5: Cognitive engagement has a positive impact on teachers' self-preparation.

2.3.2. The relationship between work engagement and teacher adaptability

Work engagement is considered as the way a person devotes more time and energy to accomplish a task. Engagement is thus a positive characteristic that produces good outcomes (Han & Wang, 2021). The important role of work engagement in teachers' development has also attracted the attention of researchers in psychology and education, because teachers' cognitive and emotional engagement in teaching activities is considered to have a positive impact on their teaching performance (Wang et al., 2022). Teacher engagement represents teachers' efforts to achieve positive educational outcomes, and their positive attitudes towards teaching (Han et al., 2021). Furthermore, research has indicated that teachers who experience high levels of vitality (emotional engagement) have high levels of energy and resilience in their work and are willing to put effort into their work (cognitive engagement), and persist in the face of difficulty (behavioral engagement) (Pöysä et al., 2021).

Adaptability refers to a person's ability to self-regulate cognitively, behaviorally, and emotionally to cope with changing, new, or uncertain environments, which is referred to as the adaptive tripartite (cognitive, behavioral, emotional) perspective (Burns et al., 2018; Martin et al., 2013). In the constructivist approach to the study of career adaptability, it is argued that one's career development is shaped by the interaction between the individual and the environment (Hou et al., 2019). Therefore, engagement can be treated as a predictor of adaptive resources (Datu & Buenconsejo, 2021). Based on the above, when novice teachers have a high level of devotion to their teaching tasks, they have good adaptability in their teaching work. Therefore, this study adopted work engagement to explore the relationship between participants' work engagement and teacher adaptability. The hypotheses are as follows:

H2: Behavioral engagement has a positive impact on teachers' adaptability.

H4: Emotional engagement has a positive impact on teachers' adaptability.

H6: Cognitive engagement has a positive impact on teachers' adaptability.

2.3.3. The relationship between teachers' self-preparation and teachers' adaptability

Teachers need to be prepared and supported to operate effectively in classrooms and schools. All teaching situations and contexts are not the same even within schools, so it is critical to avoid generalizations that classify all teaching in the same way into similar contexts (Mulryan-Kyne, 2007). Previous research also pinpoints that for teachers to make the necessary adjustments promptly to navigate the unpredictability of complex instructional domains (Chen, in press). Besides, some studies have pointed out that in order to adapt to curriculum reform, teachers must prepare themselves for their roles in curriculum design and implementation, and understand curriculum changes and values (Nguyen & Duong, 2022). To adapt, teachers must acquire broad knowledge, have a deep understanding of effective pedagogy, and know their students well (Parsons & Vaughn, 2016). Meanwhile, pre-service teachers also believe that enhancing their teacher preparation can help them to learn about how to adapt to unexpected situations (Sepulveda-Escobar & Morrison, 2020). Therefore, in order to adapt to the teaching tasks well, the preparation of all is essential.

Although novice teachers may have been learned to how to apply theory to teaching practice through coursework and field trips in their studies, they still only have partial reference information, which is still not enough to help them navigate and negotiate their roles as teachers since various tasks of high complexity are involved (Chen, in press). Novice teachers work hard to build their basic confidence and competencies as professionals, including active social integration through teacher preparation to adapt to change (Hargreaves, 2005). It can be hypothesized that when teachers are actively prepared, they become more competent and adapt to the complexities of their teaching work. Therefore, this study adapted teachers' self-preparation to explore the relationship between participants' self-preparation and teacher adaptability. The hypothesis is as follows:

H7: Teachers' self-preparation has a positive impact on teachers' adaptability

3. Research Methods

3.1. Procedure and Participants

Questionnaire survey is a common data collection method in quantitative research. This study adopted the convenience sampling technique to execute online questionnaires, and invited novice teachers in higher vocational colleges and vocational undergraduate programs to fill in the questionnaires in the WeChat communities of Chinese higher vocational colleges. The data collection platform used in this study was the Wenjuanxing platform, which was one of the most well-known platforms in China. The questionnaire collection time was from November 15 to December 15, 2022. The number of returned questionnaires was 600.

The purpose of this study, the use of data, the privacy protection and rights of the participants, and the contact information of the researchers were first stated in the online questionnaire. All participants were informed to agree to participate in the study before filling out the questionnaire. The participants could directly close the questionnaire webpage if they did not agree. According to the current regulations in China, this study did not require research ethics review, but the participants' rights of anonymity and personal data protection were guaranteed in the study. Meanwhile, all returned questionnaires obtained the informed consent of the participants. There were 600 participants in this study from whom 76 invalid data were deleted, leaving 523 valid study participants. The effective recovery rate was 87.2%, including 199 male teachers (38%) and 234 female teachers (62%); 34 respondents (6.5%) had a bachelor's degree, 381 (72.8%) had a master's degree, and 108 (20.7%) had a doctorate degree; 216 (41.3%) taught in public schools, and 307 taught in private schools (58.7%); 88 (16.8%) were teaching in universities of science and technology, and 435 (83.2%) were vocational specialists; the average age was 29.82 years old (with a standard deviation of 3.83 years old).

3.2. Questionnaire

The questionnaire used in this study was developed from questionnaires that have already been validated in previous studies, as well as related theoretical concepts, and were reviewed for two rounds of content validity by three experts in the field of vocational education with doctorates, to confirm that the questionnaire items used in this study allow participants to respond to the topics correctly. The content was easy to understand and the number of questions was appropriate. The questionnaire used in this study was based on the Likert 5-point scale as the evaluation standard, with 1 being *strongly disagree* and 5 being *strongly agree*.

3.2.1. Work Engagement

This study adopted the professional engagement scale of Hwang et al. (2020), with nine items in each construct, giving a total of 27 items, to measure the level of engagement participants perceived in teachers' work tasks. An example of behavioral engagement is: "I am used to finishing work before taking a break." An example of emotional engagement is: "The more difficult things I encounter at work, the more I like to challenge them." Examples of cognitive engagement are: "I plan ahead before the work takes place."

3.2.2. Teachers' self-preparation

According to the definition of teachers' self-preparation, we compiled a scale with eight items in total to measure participants' perceptions of their own readiness for teaching tasks. Example questions include: "I often read books related to my teaching profession" and "I always think about how to improve my teaching skills."

3.2.3. Teacher adaptability

According to the definition of teachers' adaptability, we compiled a scale with eight items in total to measure the degree to which participants perceived themselves as adaptable to teaching tasks. Example questions include: "I have mastered the skills of interacting with students" and "I know how to use the corresponding teaching method according to the characteristics of the course."

3.3. Statistical Analysis Techniques

Structural Equation Modeling (SEM) is a powerful multivariate statistical tool for testing and evaluating causal relationships in models (Thakkar, 2020). Theoretical models developed using this approach are often related to the data collected to validate the model. This association is called model fit, and any theoretical model can use data to assess this fit (Dash & Paul, 2021). This study adopted the SEM statistical technique to verify the research model. Before the verification, this study first confirmed the degree of fitness of the theoretical model.

4. Research results

Before proceeding further with model validation, the reliability and validity of the specified measurement model must be assessed (Dash & Paul, 2021). Therefore, the measurement model was first analyzed, following by the reliability and validity of the constructs. Overall fitness analysis was conducted, and finally verification of the research model was performed.

4.1. Measurement Model

A good measurement model is a prerequisite for researching equation models. According to the comprehensive recommendations of Hair et al. (2019) and Kenny et al. (2015), the following standards for this study were that the χ^2/df value should be less than 5; RMSEA should be less than .10; GFI and AGFI should be higher than .80; and the factor loading (FL) of all items should be higher than .50. The analysis results are shown in Table 1. The result of deleting items at this stage was that behavioral engagement was reduced from nine to six items; emotional engagement was reduced from nine to six items; cognitive engagement was reduced from nine to six items; teachers' self-preparation was reduced from eight to five items; and teachers' adaptability was reduced from eight to six items.

According to the recommendations of Cor (2016) and Green and Salkind (2004) on external validity analysis, in the *t* test of high and low groups, if the *t*-value is greater than or equal to 3, the item is considered to have external validity. It can be seen from Table 1 that all items in this study had external validity, and the *t*-values of the items ranged from 11.73 to 36.58.

Table 1: Measurement Model Analysis

Construct	χ^2	<i>df</i>	χ^2/df	RMSEA	GFI	AGFI	FL	<i>t</i>
Critical value	---	---	< 5	< .10	> .80	> .80	> .50	> 3
Behavioral engagement	38.7	9	4.30	.08	.98	.94	.70~ .91	11.73~ 25.24
Emotional engagement	30.3	9	3.37	.07	.98	.95	.63~ .86	23.46~ 31.19
Cognitive engagement	37.8	9	4.20	.08	.98	.95	.65~ .84	22.50~ 25.17
Teachers' self-preparation	18.9	5	3.78	.07	.99	.96	.73~ .86	24.11~ 36.58
Teachers' adaptability	21.5	9	2.39	.05	.98	.97	.69~ .92	23.75~ 31.59

4.2. Reliability and validity analysis

Hair et al. (2019) stated that the Cronbach's α and composite reliability (CR) values should exceed .70 to ensure reliability and validity. As Table 2 indicates, the Cronbach's α values in this study ranged from .89 to .93, while the CR values were from .89 to .92.

According to Hair et al. (2019) and Hair et al. (2011), factor loading (FL) values should be higher than .50, while average variance extracted (AVE) values should exceed .50. Table 2 shows that in this study, the FL values of the constructs ranged from .76 to .81, while the AVE values were between .58 and .66.

Table 2: Reliability and validity analysis

Construct	<i>M</i>	<i>SD</i>	α	CR	AVE	<i>FL</i>
	---	---	> .70	> .70	> .50	> .50
Behavioral engagement	4.58	.52	.89	.89	.58	.76
Emotional engagement	4.34	.58	.89	.89	.58	.76
Cognitive engagement	4.50	.57	.89	.90	.59	.77
Teachers' self-preparation	4.24	.70	.91	.89	.61	.78
Teachers' adaptability	4.41	.62	.93	.92	.66	.81

It is important to confirm that each construct is independent of each other (discriminant validity). According to Awang (2015), discriminant validity is achieved when the AVE value of each construct exceeds the correlation coefficient value of the other constructs. In this study, the five constructs all met this criterion and thus had discriminant validity.

Table 3: Construct discriminant validity analysis

Construct	1	2	3	4	5
Behavioral engagement	(.87)				
Emotional engagement	.54	(.87)			
Cognitive engagement	.58	.62	(.88)		
Teachers' self-preparation	.49	.68	.56	(.88)	
Teachers' adaptability	.52	.66	.56	.72	(.90)

4.3. Overall fitness analysis

The overall fit analysis can confirm the degree of fit of the research model. Hair et al. (2019) and Abedi et al. (2015) stated that, for overall fitness, the χ^2/df value of the research model must be less than 5, the RMSEA value should be less than .1, GFI, AGFI, NFI, NNFI, CFI, IFI, and RFI values should all be greater than .80, while PNFI and PGFI values should be greater than .50. The fitting index values of this research model were $\chi^2 = 1450.2$, $df = 370$, $\chi^2/df = 3.92$, RMSEA = .08, GFI = .84, AGFI = .81, NFI = .87, NNFI = .89, CFI = .90, IFI = .90, RFI = .86, PNFI = .80, and PGFI = .71.

4.4. Model Validation

The model verification results showed that behavioral engagement had a positive effect on teachers' self-preparation ($\beta = .15^{**}$); emotional engagement had a positive effect on teachers' self-preparation ($\beta = .62^{***}$); cognitive engagement had a positive effect on teachers' self-preparation ($\beta = .20^{***}$); behavioral engagement had a positive impact on teachers' adaptability ($\beta = .12^{**}$); emotional engagement had a positive effect on teachers' adaptability ($\beta = .26^{***}$), cognitive engagement had a positive effect on teachers' adaptability ($\beta = .14^{**}$), and teachers' self-preparation had a positive effect on teachers' adaptability ($\beta = .49^{***}$). This meant that the seven research hypotheses in the study were all supported, as shown in Figure 2 and Table 4.

Besides, the explanatory power of the three types of work engagement on teachers' self-preparation was 44%, and f^2 was .79; the explanatory power of the three types of work engagement and teachers' self-preparation on teachers' adaptability was 53%, and f^2 was 1.13, as shown in Figure 2.

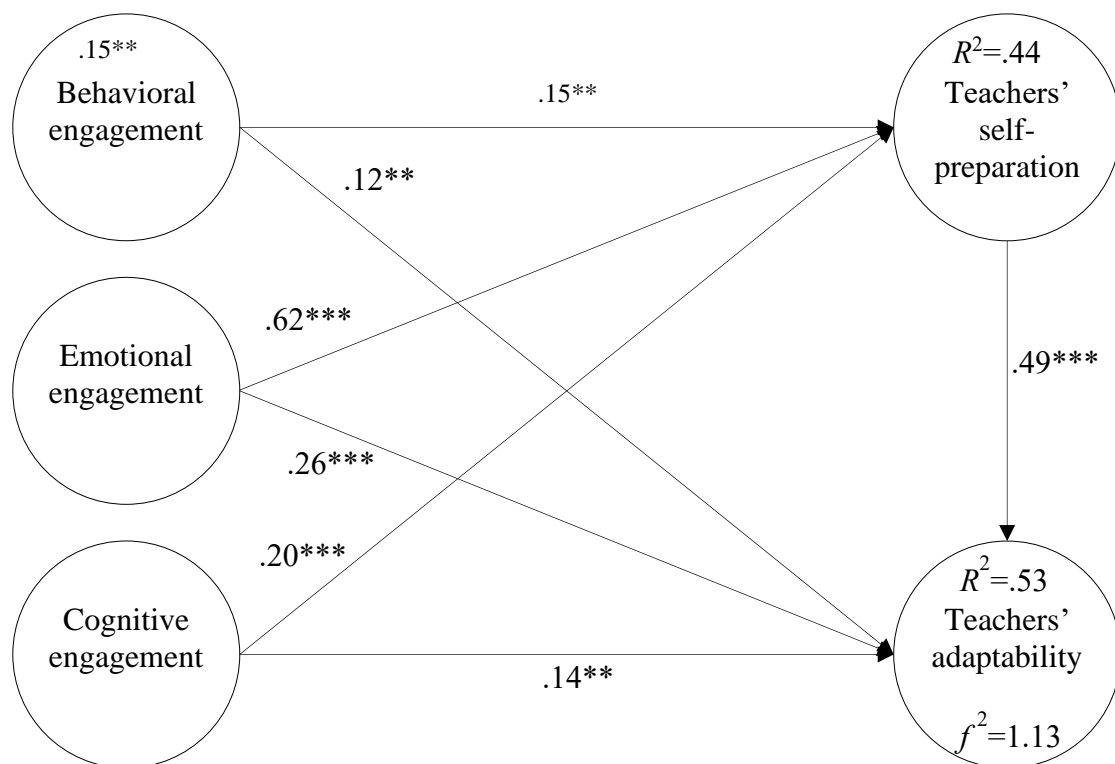


Fig. 2: Research Model Validation

Table 4: Hypothesis Verification Results

	Hypothesis	β	Results
H1	Behavioral engagement had a positive effect on teachers' self-preparation	.15**	Sustained
H2	Emotional engagement had a positive effect on teachers' self-preparation	.62***	Sustained
H3	Cognitive engagement had a positive effect on teachers' self-preparation	.20***	Sustained
H4	Behavioral engagement had a positive impact on teachers' adaptability	.12**	Sustained
H5	Emotional engagement had a positive effect on teachers' adaptability	.26***	Sustained
H6	Cognitive engagement had a positive effect on teachers' adaptability	.14**	Sustained
H7	Teachers' self-preparation had a positive effect on teachers' adaptability	.49***	Sustained

5. Research Discussion

Fredricks and Simpkins (2013) proposed engagement as the degree of performance of an educator's commitment and input into an activity or task. From the results of descriptive statistical analysis of this study, the mean value of behavioral engagement of the participants was 4.58, which is higher than the mean value (3.000) of the Likert scale, indicating that the novice teacher respondents had a high degree of practical action in teachers' work tasks. The mean value of participants' emotional engagement was 4.34, which was higher than the average level (3.000) of the Likert scale, indicating that new teachers had positive emotional responses to teachers' work tasks. In addition, the mean value of cognitive engagement of the participants was 4.50, which was higher than the average value (3.000) of the Likert scale, indicating that these novice teachers were highly focused on the teacher's work tasks. Therefore, teacher preparation is critical to cultivating good teachers (Bouton, 2016). The analysis showed that the mean value of teachers' self-preparation of the participants was 4.24, which was higher than the average level (3.000) of the Likert scale, indicating that novice teachers had a high degree of perfection in the preparation process for teaching work. Additionally, teachers' adaptability helped teachers to navigate changes, novelty, and uncertainty in their work (Collie et al., 2020). The analysis results showed that the mean value of the participant teachers' adaptability was 4.41, which was higher than the average level (3.000) of the Likert scale, indicating that the novice teachers had good adaptability to their work tasks.

5.1. Three types of work engagement have positive effects on teachers' self-preparation

The analysis results of this study showed that three types of work engagement had positive effects on teachers' self-preparation. In other words, the more the former teacher input into the teacher's work tasks, the more perfect the teacher's self-preparation would be. This was also consistent with the concept proposed in the previous research. For example, because work engagement is a sense of professional commitment (Han & Wang, 2021), people with higher levels of work engagement have many advantages (Zeng et al., 2019). Greenier et al. (2021) also proposed that work engagement, as a positive element in the workplace, can promote personal development. In addition, Zis et al. (2016) and Banihani et al. (2013) also believed that job-based engagement is energetic, has positive emotions, and will redouble efforts to improve organizational performance.

5.2. Three types of work engagement have positive effects on teachers' adaptability

The analysis results of this study showed that three types of work engagement had positive effects on teachers' adaptability. When a novice teacher in a vocational college devotes more into the teacher's

work tasks, the teacher's adaptability will be better. As indicated by Han and Wang (2021), work engagement is a positive characteristic that produces good outcomes. Wang et al. (2022) also believed that work engagement plays an important role in teachers' development, because teachers' cognitive and emotional engagement in teaching activities is considered to have a positive impact on their teaching performance. Therefore, good teacher engagement can be conceptualized as teachers' efforts, and is related to positive educational outcomes, as well as teachers' positive attitudes toward teaching (Han et al., 2021). Burns et al. (2018) and Martin et al. (2013) proposed that adaptability is a person's ability to self-regulate in cognition, behavior and emotion to cope with changing, novel or uncertain environments. Pöysä et al. (2021) found that teachers who experienced high levels of vitality had high levels of energy and resilience at work, were willing to work hard, and persisted in the face of difficulties. In addition, research by Datu and Buenconsejo (2021) confirmed that behavioral engagement is a strong predictor of career adaptability.

5.3. Teachers' self-preparation has a positive impact on teachers' adaptability

The analysis results of this study showed that teachers' self-preparation has a positive impact on teachers' adaptability. When a novice teacher in a vocational college is more suitable in terms of teachers' self-preparation, he/she will be better adapted to teaching. Mulryan-Kyne (2007) pointed out that teachers need to be prepared and supported to function effectively in classrooms and schools. Additionally, Chen's (in press) research also called for teachers to be prepared to make the necessary adjustments to navigate the unpredictability of complex instructional domains. The research of Nguyen and Duong (2022) also pointed out that teachers must prepare themselves for their roles in curriculum design and implementation in order to understand the changes and values of the curriculum. The study of Sepulveda-Escobar and Morrison (2020) also confirmed that the interviewed pre-service teachers believed that improving their teacher preparation could help them learn how to adapt to unexpected situations. Hargreaves (2005) suggested that novice teachers actively integrate into society through teacher preparation to adapt to change, and strive to build their basic confidence and competence as professionals.

5.4. Practical and theoretical implications

Measuring what happens during teacher preparation has been a long-standing puzzle in the field of teaching (Cohen & Berlin, 2020), since developing an effective research model for teacher preparation is an ongoing challenge for teacher educators (Carmi & Tamir, 2022). The research model proposed in this study based on the engagement theory will help to understand teachers' self-preparation and adaptation. This was the first theoretical contribution of this study.

Research on teacher engagement is limited and there are still many unknowns (Jiang et al., 2021). In the past, the engagement theory proposed by Fredricks et al. (2004) was generally used to explain students' participation in learning tasks, but it has been less frequently adopted to explain teacher engagement in work or otherwise. However, in this study, it is confirmed that engagement theory can help explain the research topic of teacher groups, confirming that it is a theory that can be extended to different groups and situations. This was the second theoretical contribution of this study.

Rudolph et al. (2019) pointed out that empirical research results based on Career Construction Theory (CCT) are important because they can serve as the basis for career development practice. This study is an empirical study based on the career preparation of novice teachers in vocational colleges. It can provide teachers with knowledge of how to effectively apply different types of input in the early stage of teaching, so as to complete work preparation more quickly and adapt to teachers' teaching tasks. This was the practical contribution of this study.

6. Conclusions and Recommendations

6.1. Conclusion

The construction of high-quality teaching staff has been the focus of China's education authorities, normal colleges, and teacher education scholars. Ensuring that teachers are still adaptable early in their careers is important. Therefore, on the basis of engagement theory, this study explored the relationship of three types of work engagement with teachers' self-preparation and career adaptability. The research results showed that: 1. The three types of work engagement have positive effects on teachers' self-preparation and career adaptability; and 2. Teachers' self-preparation also has a positive effect on career adaptability. If novice teachers actively devote themselves to their work tasks, they will be able to complete the preparation work well and will be better adapted to the teacher's work. That is to say, work engagement is an important factor in the early stage of career development of novice teachers. In addition, judging from the characteristics of the participants, the novice teachers teaching in vocational colleges mainly have a master's degree, which is also in line with the current situation of the teacher structure in vocational colleges in China.

6.2. Research limitations and recommendations for future research

There are some limitations to this study that should be noted. Although this study confirmed the correlation of three types of work engagement with teachers' self-preparation and teachers' adaptability, what factors cause the relationship between them to varying degrees is still unknown. Therefore, it is suggested that follow-up research can interview new teachers and further explore the factors behind the different degrees of relationship. Secondly, the participants in this study were novice teachers, but the role of the adjustment and training mechanism from the novice (beginning) stage to the expert (senior) stage is still unanswered. Therefore, it is suggested that teachers of different levels of seniority be invited to participate in follow-up research to understand changes in teachers' work input, teachers' self-preparation and adaptability, etc. In this way, we can better understand the career development of teachers.

Third, China has adopted a number of policies to promote the professional development of teachers. How these educational policies help teachers and students deserves further discussion, so as to understand the actual views of policy stakeholders. Therefore, it is suggested that follow-up research should use qualitative, quantitative, or mixed empirical research methods in different policy contexts to explore the implementation effects of policy measures and their related feelings.

Acknowledgement

This work was supported by Fundamental Research Funds for the Central Universities in China (Grant Number. 2022NTSS52) and Beijing Normal University's First-class Discipline Cultivation Project for Educational Science (Grant Numbers: YLXKPY-XSDW202211, YLXKPY-ZYSB202201).

References

- Abedi, G., Rostami, F., & Nadi, A. (2015). Analyzing the dimensions of the quality of life in hepatitis B patients using confirmatory factor analysis. *Global Journal of Health Science*, 7(7), 22-31. <https://doi.org/10.5539/gjhs.v7n7p22>
- Ahmed, A., & Sayed, K. (2021). An extensive model for implementing competency-based training in technical and vocational education and training teacher training system for Assiut-integrated technical education cluster, Egypt. *The Journal of Competency-Based Education*, 6(2), e01245. <https://doi.org/10.1002/cbe2.1245>

- Alamsyah, M. S. M., Widiaty, I., Wahyudin, D., Barliana, M. S., Rahmawati, Y., Meriawan, D., Purnawarman, P., Abdulkarim, A., Maknun, J., & Suryadi, E. (2022). Indonesia TVET Teacher training: Policy and implementation to meet industry demands. In F. Bünning, G. Spöttl, & H. Stolte (Eds.), *Technical and vocational teacher education and training in international and development co-operation* (pp. 183-214). Springer. https://doi.org/10.1007/978-981-16-6474-8_12
- Awang, Z. (2015). SEM made simple, a gentle approach to learning structural equation modeling. MPWS Rich Publication Sdn. Bhd.
- Banihani, M., Lewis, P., & Syed, J. (2013). Is work engagement gendered? *Gender in Management: An International Journal*, 28(7), 400-423. <https://doi.org/10.1108/GM-01-2013-0005>
- Borup, J., Graham, C. R., & Drysdale, J. S. (2014). The nature of teacher engagement at an online high school. *British Journal of Educational Technology*, 45(5), 793-806. <https://doi.org/10.1111/bjet.12089>
- Bouton, B. (2016). Empathy research and teacher preparation: Benefits and obstacles. *Srate Journal*, 25(2), 16-25.
- Burns, E. C., Martin, A. J., & Collie, R. J. (2018). Adaptability, personal best (PB) goals setting, and gains in students' academic outcomes: A longitudinal examination from a social cognitive perspective. *Contemporary Educational Psychology*, 53, 57-72. <https://doi.org/10.1016/j.cedpsych.2018.02.001>
- Carmi, T., & Tamir, E. (2022). Three professional ideals: Where should teacher preparation go next? *European Journal of Teacher Education*, 45(2), 173-192. <https://doi.org/10.1080/02619768.2020.1805732>
- Chen, J. J. (in press). Pedagogical adaptability as an essential capacity: Reflective practice of applying theory to practice among first-year early childhood teachers during remote instruction. *Journal of Early Childhood Teacher Education*. <https://doi.org/10.1080/10901027.2022.2147879>
- Clark, S. K. (2012). The plight of the novice teacher. *The Clearing House: A Journal of Educational Strategies, Issues and Ldeas*, 85(5), 197-200. <https://doi.org/10.1080/00098655.2012.689783>
- Cohen, J., & Berlin, R. (2020). What constitutes an "opportunity to learn" in teacher preparation? *Journal of Teacher Education*, 71(4), 434-448. <https://doi.org/10.1177/0022487119879893>
- Collie, R. J., Granziera, H., Martin, A. J., Burns, E. C., & Holliman, A. J. (2020). Adaptability among science teachers in schools: A multi-nation examination of its role in school outcomes. *Teaching and Teacher Education*, 95, 103148. <https://doi.org/10.1016/j.tate.2020.103148>
- Cor, M. K. (2016). Trust me, it is valid: Research validity in pharmacy education research. *Currents in Pharmacy Teaching and Learning*, 8(3), 391-400. <https://doi.org/10.1016/j.cptl.2016.02.014>
- Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*, 173, 121092. <https://doi.org/10.1016/j.techfore.2021.121092>
- Datu, J. A. D., & Buenconsejo, J. U. (2021). Academic engagement and achievement predict career adaptability. *The Career Development Quarterly*, 69(1), 34-48. <https://doi.org/10.1002/cdq.12247>
- Eccles, J. S. (2016). Engagement: Where to next? *Learning and Instruction*, 43, 71-75. <https://doi.org/10.1016/j.learninstruc.2016.02.003>
- Eryilmaz, A., & Kara, A. (2018). A career adaptability model for pre-service teachers. *Erzincan University Journal of Education Faculty*, 20(2), 352-365. <https://doi.org/10.17556/erziefd.322596>

- Farinde-Wu, A., & Griffen, A. J. (2019). Black female teachers on teacher preparation and retention. *Penn GSE Perspectives on Urban Education*, 16(1), n1.
- Fredricks, J. A., & Simpkins, S. D. (2013). Organized out-of-school activities and peer relationships: Theoretical perspectives and previous research. *New Directions for Child and Adolescent Development*, 2013(140), 1-17. <https://doi.org/10.1002/cad.20034>
- Fredricks, J. A., Blumenfeld, P. C., Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109. <https://doi.org/10.3102/00346543074001059>
- Fredricks, J. A., Bohnert, A. M., & Burdette, K. (2014). Moving beyond attendance: Lessons learned from assessing engagement in afterschool contexts. *New Directions for Youth Development*, 2014(144), 45-58. <https://doi.org/10.1002/yd.20112>
- Gholam, A. (2018). A mentoring experience: From the perspective of a novice teacher. *International Journal of Progressive Education*, 14(2), 1-12.
- Goldhaber, D. (2019). Evidence-based teacher preparation: Policy context and what we know. *Journal of Teacher Education*, 70(2), 90-101. <https://doi.org/10.1177/0022487118800712>
- Graça, M., Pais, L., Mónico, L., Santos, N. R. D., Ferraro, T., & Berger, R. (2021). Decent work and work engagement: A profile study with academic personnel. *Applied Research in Quality of Life*, 16(3), 917-939. <https://doi.org/10.1007/s11482-019-09780-7>
- Green, S. B., & Salkind, N. (2004). Using SPSS for Windows and Macintosh: Analyzing and understanding data (4th ed.). Prentice-Hall.
- Greenier, V., Derakhshan, A., & Fathi, J. (2021). Emotion regulation and psychological well-being in teacher work engagement: A case of British and Iranian English language teachers. *System*, 97, 102446. <https://doi.org/10.1016/j.system.2020.102446>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2019). *Multivariate data analysis* (8th ed.). Cengage.
- Hair, J. F., Ringle, C M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-152. <https://doi.org/10.2753/MTP1069-6679190202>
- Han Y., & Wang Y. (2021). Investigating the correlation among Chinese EFL teachers' self-efficacy, work engagement, and reflection. *Frontiers in Psychology*, 12, 763234. <https://doi.org/110.3389/fpsyg.2021.763234>
- Han, J., Perron, B. E., Yin, H., & Liu, Y. (2021). Faculty stressors and their relations to teacher efficacy, engagement and teaching satisfaction. *Higher Education Research & Development*, 40(2), 247-262.
- Han, Y., & Wang, Y. (2021). Investigating the correlation among Chinese EFL teachers' self-efficacy, work engagement, and reflection. *Frontiers in Psychology*, 12, 763234. <https://doi.org/10.3389/fpsyg.2021.763234>
- Hargreaves, A. (2005). Educational change takes ages: Life, career and generational factors in teachers' emotional responses to educational change. *Teaching and Teacher Education*, 21(8), 967-983. <https://doi.org/10.1016/j.tate.2005.06.007>
- Hou, C., Wu, Y., & Liu, Z. (2019). Career decision-making self-efficacy mediates the effect of social support on career adaptability: A longitudinal study. *Social Behavior and Personality: An International Journal*, 47(5), 1-13. <https://doi.org/10.2224/sbp.8157>

Hwang, M. Y., Hong, J. C., Tai, K. H., Chen, J. T., & Gouldthorp, T. (2020). The relationship between the online social anxiety, perceived information overload and fatigue, and job engagement of civil servant LINE users. *Government Information Quarterly*, 37(1), 101423. <https://doi.org/10.1016/j.giq.2019.101423>

Janosz, M. (2012). Part IV commentary: Outcomes of engagement and engagement as an outcome: Some consensus, divergences, and unanswered questions. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 695-703). Boston, MA: Springer.

Jiang, L., Yu, S., & Zhao, Y. (2021). Teacher engagement with digital multimodal composing in a Chinese tertiary EFL curriculum. *Language Teaching Research*, 25(4), 613-632. <https://doi.org/10.1177/1362168819864975>

Jin, W., Zheng, X., Gao, L., Cao, Z., & Ni, X. (2022). Basic psychological needs satisfaction mediates the link between strengths use and teachers' work engagement. *International Journal of Environmental Research and Public Health*, 19(4), 2330. <https://doi.org/10.3390/ijerph19042330>

Jin, X., Tigelaar, D., van der Want, A., & Admiraal, W. (in press). The effects of a teacher development programme in Chinese vocational education on the efficacy and professional engagement of novice teachers. *Journal of Education for Teaching*. <https://doi.org/10.1080/02607476.2022.2072713>

Kara, A., Orum-Çattık, E., & Eryılmaz, A. (2022). Adaptivity, adaptability, adapting response, and adaptation result: Testing with structural equation modelling on pre-service teachers. *Current Psychology*, 41, 4171-4182. <https://doi.org/10.1007/s12144-021-01975-2>

Kaub, K., Karbach, J., Spinath, F. M., & Brünken, R. (2016). Person-job fit in the field of teacher education – An analysis of vocational interests and requirements among novice and professional science and language teachers. *Teaching and Teacher Education*, 55, 217-227. <https://doi.org/10.1016/j.tate.2016.01.010>

Kenny, D. A., Kaniskan, B., & McCoach, D. B. (2015). The performance of RMSEA in models with small degrees of freedom. *Sociological Methods & Research*, 44(3), 486-507. <https://doi.org/10.1177/0049124114543236>

Lefebvre, J., Lefebvre, H., & Lefebvre, B. (in press). Reflection of novice teachers on their teaching practice. *Reflective Practice*. <https://doi.org/10.1080/14623943.2022.2056883>

Lyckander, R. H. (in press). Exploring vocational teacher preparation in Norway: A study of dimensions and differences in vocational teacher learning. *Journal of Vocational Education & Training*. <https://doi.org/10.1080/13636820.2021.2007985>

Mahmut, Ö. Z. E. R. (2020). Vocational education and training as “A friend in need” during coronavirus pandemic in Turkey. *Bartın University Journal of Faculty of Education*, 9(2), 1-7. <https://doi.org/10.14686/buefad.713574>

Mäkinen, M. (2013). Becoming engaged in inclusive practices: Narrative reflections on teaching as descriptors of teachers' work engagement. *Teaching and Teacher Education*, 35, 51-61. <https://doi.org/10.1016/j.tate.2013.05.005>

Martin, A. J., Nejad, H. G., Colmar, S., & Liem, G. A. D. (2013). Adaptability: How students' responses to uncertainty and novelty predict their academic and non-academic outcomes. *Journal of Educational Psychology*, 105(3), 728-746. <https://doi.org/10.1037/a0032794>

Miller, J., Warren, E., & Armour, D. (2020). Examining changes in young Aboriginal and Torres Strait Island students and their beginning primary school teachers' engagement in the teaching and learning of mathematics. *ZDM*, 52(3), 557-569.

- Moreira-Fontán, E., García-Señorán, M., Conde-Rodríguez, Á., & González, A. (2019). Teachers' ICT-related self-efficacy, job resources, and positive emotions: Their structural relations with autonomous motivation and work engagement. *Computers & Education*, 134, 63-77. <https://doi.org/10.1016/j.compedu.2019.02.007>
- Mulryan-Kyne, C. (2007). The preparation of teachers for multiride teaching. *Teaching and Teacher Education*, 23(4), 501-514. <https://doi.org/10.1016/j.tate.2006.12.003>
- Nawi, A., Hamzah, M. I., Ren, C. C., & Tamuri, A. H. (2015). Adoption of mobile technology for teaching preparation in improving teaching quality of teachers. *International Journal of Instruction*, 8(2), 113-124.
- Nguyen, P. H., & Duong, T. H. Y. (2022). Teachers' adaptability to general curriculum reform. *VNU Journal of Science: Education Research*, 38(3), 85-95. <https://doi.org/10.25073/2588-1159/vnuer.4308>
- Parsons, S. A., & Vaughn, M. (2016). Toward adaptability: Where to from here? *Theory into Practice*, 55(3), 267-274. <https://doi.org/10.1080/00405841.2016.1173998>
- Perera, H. N., Vosicka, L., Granziera, H., & McIlveen, P. (2018). Towards an integrative perspective on the structure of teacher work engagement. *Journal of Vocational Behavior*, 108, 28-41. <https://doi.org/10.1016/j.jvb.2018.05.006>
- Pöysä, S., Pakarinen, E., & Lerkkanen, M. K. (2021). Patterns of teachers' occupational well-being during the COVID-19 pandemic: relations to experiences of exhaustion, recovery, and interactional styles of teaching. *Frontiers in Education*, 6, 699785. <https://doi.org/10.3389/educ.2021.699785>
- Ritoša, A., Danielsson, H., Sjöman, M., Almqvist, L., & Granlund, M. (2020). Assessing school engagement—adaptation and validation of “engagement versus disaffection with learning: Teacher report” in the Swedish educational context. *Frontiers in Education*, 5, 521972. <https://doi.org/10.3389/educ.2020.521972>
- Rudolph, C. W., Zacher, H., & Hirschi, A. (2019). Empirical developments in career construction theory. *Journal of Vocational Behavior*, 111, 1-6. <https://doi.org/10.1016/j.jvb.2018.12.003>
- Runhaar, P., Sanders, K., & Konermann, J. (2013). Teachers' work engagement: Considering interaction with pupils and human resources practices as job resources. *Journal of Applied Social Psychology*, 43(10), 2017-2030. <https://doi.org/10.1111/jasp.12155>
- Sahin, I., & Kirdök, O. (2018). Investigation of relationship between high school students' career adaptability, subjective well-being and perceived social support. *International Education Studies*, 11(8), 127-135. <https://doi.org/10.5539/ies.v11n8p127>
- Savickas, M. L. (2005). The theory and practice of career construction. In D. Brown, & R. W. Lent (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 42–70). Hoboken, NJ: Wiley.
- Sepulveda-Escobar, P., & Morrison, A. (2020). Online teaching placement during the COVID-19 pandemic in Chile: challenges and opportunities. *European Journal of Teacher Education*, 43(4), 587-607. <https://doi.org/10.1080/02619768.2020.1820981>
- Serafini, M. (2018). The professional development of VET teachers in Italy: participation, needs and barriers. Statistical quantifications and benchmarking in an international perspective. *Empirical Research in Vocational Education and Training*, 10(1), 1-42. <https://doi.org/10.1186/s40461-018-0064-9>
- Thakkar, J. J. (2020). *Structural equation modelling*. Springer. https://doi.org/10.1007/978-981-15-3793-6_4

- Tran, L. T., & Pasura, R. (2018). Professional development for teachers working with international students. *Vocations and Learning*, 11(2), 345-364. <https://doi.org/10.1007/s12186-017-9195-6>
- Tran, L. T., & Pasura, R. (2021). The nature of teacher professional development in Australian international vocational education. *Journal of Further and Higher Education*, 45(1), 16-29. <https://doi.org/10.1080/0309877X.2019.1702153>
- Vivante, I., & Vedder-Weiss, D. (2022). Examining science teachers' engagement in professional development: A multimodal situated perspective. *Journal of Research in Science Teaching*. <https://doi.org/10.1002/tea.21836>
- Wang, J., Zhang, X., & Zhang, L. J. (2022). Effects of teacher engagement on students' achievement in an online English as a foreign language classroom: The mediating role of autonomous motivation and positive emotions. *Frontiers in Psychology*, 13, 950652. <https://doi.org/10.3389/fpsyg.2022.950652>
- Wen, Y., Liu, F., Pang, L., & Chen, H. (2022). Proactive personality and career adaptability of Chinese female pre-service teachers in primary schools: The role of calling. *Sustainability*, 14(7), 4188. <https://doi.org/10.3390/su14074188>
- Whalen, C., Majocha, E., & Van Nuland, S. (2019). Novice teacher challenges and promoting novice teacher retention in Canada. *European Journal of Teacher Education*, 42(5), 591-607. <https://doi.org/10.1080/02619768.2019.1652906>
- Xiao, Y., Fathi, J., & Mohammaddockht, F. (2022). Exploring a structural model of teaching enjoyment, teacher self-efficacy, and work engagement. *Frontiers in Psychology*, 13, 918488. <https://doi.org/10.3389/fpsyg.2022.918488>
- Xiao, Y., He, Y., Gao, X., Lu, L., & Yu, X. (2021). Career exploration and college students' career adaptability: The mediating role of future work self-salience and moderating role of perceived teacher support. *Discrete Dynamics in Nature and Society*, 2021, 3532239. <https://doi.org/10.1155/2021/3532239>
- Zeng, G., Chen, X., Cheung, H. Y., & Peng, K. (2019). Teachers' growth mindset and work engagement in the Chinese educational context: Well-being and perseverance of effort as mediators. *Frontiers in Psychology*, 10, 839. <https://doi.org/10.3389/fpsyg.2019.00839>
- Zhao, Z., & Xue, P. (2022). TVET Teacher training in transformation in China. In F. Bünning, G. Spöttl, & H. Stolte (Eds.), *Technical and vocational teacher education and training in international and development co-operation* (pp. 379-391). Singapore: Springer. https://doi.org/10.1007/978-981-16-6474-8_23
- Zis, P., Anagnostopoulos, F., & Artemiadis, A. K. (2016). Residency Training: Work engagement during neurology training. *Neurology*, 87(5), e45-e48. <https://doi.org/10.1212/WNL.0000000000002911>