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The effects of a teacher development programme in chinese vocational education on the efficacy and professional engagement of novice teachers

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ABSTRACT

The self-efficacy and professional engagement of novice teachers were examined in the context of a teacher development programme (TDP) in the Chinese vocational education context. A pre- and post-test control group design was used. The experimental and control groups contained 41 and 42 novice teachers, respectively, who were mostly in their first year. Multivariate analysis of covariance and paired samples *t*-tests showed that the TDP had significant effects on two sub-scales of teachers' efficacy (i.e. classroom management and student engagement) and one sub-scale of professional engagement (i.e. planned persistence). Then, we discussed the possible explanations of these findings and proposed suggestions for future TDPs and further research.

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Teacher development programme; efficacy; professional engagement; novice teacher; vocational education

Introduction

In the early stages of the teaching profession, teachers often suffer a praxis shock. They become aware of the gap between teaching practice and what they have learned in college, and this may cause teacher turnover. In China, this situation seems to be even more severe in vocational education and training (VET), due to characteristics of the teacher education system and teachers' working conditions.

Concerning the teacher education system in China, according to Interim Measures for Teacher Qualification Examination in Primary and Secondary Schools (The Ministry of Education of the People's Republic of China 2013), an education degree is not necessary to become a VET teacher, as long as one passes the teacher qualification examination. This examination is usually combined with a pencil paper test and a presentation in the form of micro-teaching. The former focuses on three kinds of content: teaching skills and attitudes, pedagogical knowledge and ability, and knowledge of a vocational speciality; the latter is used to test participants' understanding of teaching material assigned by the testers. Newly employed VET teachers in China are either graduates from normal universities (teacher education universities) or

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skilled workers from companies. This means that VET teachers either have an education degree or work experience, but not both (Sun 2013). This indicates that novice VET teachers may need additional support to cope with the difficulties in their teaching practices (Wang and Zhu 2013).

The working conditions also account for the challenges that novice VET teachers encounter. Previous studies showed that teachers in VET schools lack a strong professional identity and have a low professional commitment because of the poor salary, heavy workload, low social reputation, and lack of promotion opportunities in VET schools (Hu and Hao 2014; Hu and Zhou 2021; Li 2017). In addition, VET has a lower status than general secondary education in China, and most students and their parents regard VET as a last resort (Wang and Guo 2019). Thus, students who attend vocational schools usually have been rejected by general secondary schools, and they have a low learning motivation and a high rate of behaviour problems (Lin, Wei, and Zheng 2005; Yanping and Lumby 2005). This may cause VET teachers to have a low teaching efficacy and commitment to their career.

The above background provides a better understanding of the challenges that novice teachers encounter in the Chinese VET system, and it also indicates the necessity of TDPs. Although various TDPs have been organised to support novice VET teachers in China, the effects of these programmes are yet to be examined. Previous research on similar programmes in other countries has provided indications of the possible impact (Ronfeldt and McQueen 2017; Lyne 2016; Mintz 2019). For example, Ronfeldt and McQueen (2017) conducted a secondary analysis on the data from three surveys, i.e. the Schools and Staffing Survey, the Teacher Follow-Up Surveys, and the Beginning Teacher Longitudinal Survey. Their results showed that receiving induction support in the first year led to less teacher migration and attrition. Also, mentoring, seminars for beginners and supportive communication with administrators or department chairs appeared to be effective activities. However, these studies are mostly about teachers in general education, using a one-group design. This may not be enough to prove the impact of TDPs in a Chinese VET context. This study thus focuses on a TDP in the Chinese VET context and examines the effects of that TDP on the self-efficacy and professional engagement of novice teachers by using a pre- and post-test control group design.

Literature review

Teacher development programmes in China and their impact on novice teachers

Given that novice teachers in Chinese VET may not be well prepared and their turnover intention is relatively high, many TDPs are organised to improve the capability and retention of novice teachers. One of the most popular TDPs is the Teaching Research Group (TRG), which is conducted in almost all Chinese areas as a fundamental school-based teacher learning activity in both vocational schools and general schools (Yang, Ran, and Zhang 2020). The TRG works through periodic meetings where all teachers of the same school subject get together to conduct learning activities such as joint lesson planning, lesson study and public lesson. For example, Han and Paine (2010) examined the effects of two public lessons conducted by a mathematics TRG. In the public lessons, teachers in the same TRG could sit in the

back of the classroom to observe the teaching of their colleague and then discuss it after class. The authors found that public lessons assisted the teachers to design appropriate tasks, teach difficult subject-related content knowledge, and use appropriate language. Concerning the school-based induction programmes in China, mentoring is one of the most commonly used activities. Novice teachers can learn from their mentor teachers by mutual teaching observation, discussing their feedback and collaborating on their lesson plans. Lee and Feng (2007) found that this mentoring tends to have a larger effect on novice teachers' teaching of content than pedagogy and teaching skills.

Some government-funded TDPs are also available for novice VET teachers in China. These government-funded TDPs are usually comprehensive programmes consisting of many different learning activities to support novice teachers in various aspects, such as pedagogy, vocational speciality and teacher retention. Typical activities in these programmes include lectures on vocational pedagogy, novice-expert interactions, teacher apprenticeships and teacher practices in companies. For example, Jin et al. (2021) interviewed four Chinese VET teachers on their learning through expert feedback, and they found that the novice-expert interaction has positive effects on novice teachers' teaching concepts, competencies, general strategies and emotional experience. Shao and Zhou (2013) examined a teacher apprenticeship programme for VET teachers, in which novice teachers learn by observing experienced teachers' teaching, designing lesson plans collaboratively, correcting students' homework and assisting students' skill training. They found that this programme can raise teacher retention and acquaint novice VET teachers with the teaching process. The above mentioned TRG and TDPs thus seem to have positive effects on both teachers' capabilities and their intentions to stay in the profession. However, these studies are mostly exploratory. To provide more specific indicators of the impact of TDPs, we further elaborate on research where the effects of TDPs have been studied in more detail.

Teacher efficacy and professional engagement

We define teachers' efficacy as teachers' subjective assessment of their capabilities to achieve positive teaching effects, even among unmotivated and difficult students. We draw this definition from previous studies on teacher efficacy (Tschannen-Moran and Hoy 2001). Teacher efficacy can be regarded as a good predictor of both teachers' capability, commitment to teaching, and student achievement. Therefore, in previous studies, TDPs' effects on teacher efficacy have been examined. For example, in a study on a mentoring programme for Malaysian teachers, Lyne (2016) surveyed 21 teachers. With a one-group pre- and post-test design, Lyne (2016) found a significant increase in the participating teachers' self-efficacy and their use of strategies to engage students. Yoo (2016) examined 148 teachers' efficacy during an online TDP with a one group pre- and post-test design and found that the online TDP had a positive effect on all three dimensions of teachers' efficacy (i.e. instructional strategies, student engagement, and classroom management). Chan, Maneewan, and Koul (2021) also examined the effect of a cooperative learning activity for 35 pre-service English language teachers and found that after 16 weeks of collaborative learning, the pre-service teachers' grammar and vocabulary achievement and teaching efficacy improved. In

addition, Ross and Bruce (2007) designed and examined a TDP with peer communication and teaching modelling for Grade 6 mathematics teachers. Teachers who participated in the TDP outperformed control-group teachers on all three dimensions of teacher efficacy, but results were only statistically significant for efficacy of classroom management.

According to Watt and Richardson (2008), professional engagement is related to teacher' career development aspirations and plans. We thus defined professional engagement as teachers' enthusiasm for their career, which refers to how assured a teacher is about staying in and how dedicated she/he is to the teaching career. Although direct evidence of TDPs' effects on teacher professional engagement is lacking, studies on teacher retention and teaching motivation can provide some clues. Ovenden-Hope et al. (2018) studied the impact of a TDP that consists of learning activities such as teaching modules, coaching modules and a teacher learning community. The authors evaluated the programme using multiple methods and found that all novice teachers who completed the programme had persisted in teaching and had achieved a leadership role in their school. However, Gaikhorst et al. (2015) found opposite results when studying a TDP with four modules (i.e. teachers competencies on handling cultural diversity, dealing with students' language deficiencies, adapting to the school environment, and ensuring safety in class). They found that the TDP did not improve teachers' motivation for the teaching profession, and they attributed it to a ceiling effect because teachers who participated in that programme were highly motivated in the first place.

In sum, novice VET teachers in China encounter severe challenges in their teaching practices, and TDPs may support these ill-prepared novice teachers. Studying the effects of TDPs on novice VET teachers in China is necessary because it can provide both practical and academic implications for future researchers and practitioners. Given that teacher efficacy and professional engagement significantly affect teachers' capability and retention, these variables have been examined in many studies. However, previous studies on the effect of TDPs are usually focused on the general education context and/or use a one-group design. This study sets out to examine the effects of a TDP on novice teachers' efficacy and professional engagement in the Chinese VET context with a pre- and post-test control group design. The research questions are:

What is the effect of the TDP on a novice teacher's sense of efficacy?

What is the effect of the TDP on a novice teacher's professional engagement?

Method

Setting

This study collected data from the Standard Training Programme for Novice Vocational School Teachers in Shanghai (China). It is an annual programme organised by the Shanghai Municipal Education Committee and the Institute of Vocational and Technical Education of Tongji University (Shanghai, China). The programme duration is from October to July. Novice teachers attend the programme activities on a Wednesday almost every week except for the holidays. It takes 30 weeks and 240 hours to complete all courses. The participating novice teachers mostly have less than three years of teaching

experience, and the lectures or trainers in this programme are researchers in educational science and expert teachers in VET schools (the title 'expert teacher' in China is usually granted by local education committees and is given to teachers with rich experience and outstanding contributions in the teaching profession).

The main goals of this programme are increasing teacher retention in vocational schools and developing novice teachers' teaching expertise. It includes three training modules: 1) theory of VET teaching (around 53 hours), which consists of a series of lectures on the development of VET, pedagogy in VET, and educational psychology in VET; 2) teachers' professional ethic (around 80 hours), which includes lectures on the topic of classroom management, theories of moral education, and student-teacher interaction; and 3) teaching practice (around 107 hours), which is conducted mainly in the form of novice-expert interaction (i.e. feedback on novices' teaching videos and joint lesson design). Some workshop-like activities are also included in this module to improve teachers' lesson design and use of instructional technology. In addition, this programme also requires novice VET teachers to complete assignments and attend work-placement in a company to develop what they have learned in this programme.

Respondents and data collection

We used a pre-test and post-test control group design in this study. All the respondents (both experimental and control groups) had less than three years of teaching experience and were participating in the Teaching and Research Group. Novice teachers in the experimental group attended an additional TDP (i.e. the Standard Training Programme for Novice Vocational School Teachers in Shanghai).

For the experimental group, invitation emails were sent to all 144 participants of the TDP. Only 41 novice teachers agreed to complete both the pre-test and post-test. Data for the control group were collected using snowball sampling by asking teachers from the TDP to invite novice VET teachers who hadn't participated in that programme. Finally, 42 novice teachers were included in the control group and completed both the pre-test and post-test. The questionnaire was anonymous, and all participants were informed that the data would only be used for research purposes. [Table 1](#) provides an overview of the demographic characteristics of the 83 participants. Research clearance was obtained from the Ethical Committee of **[details removed for peer review]**.

Instruments

Teachers' efficacy was measured using the longer form of the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran and Hoy 2001). The TSES is one of the most widely used measures of teacher efficacy and has already been validated in many Asian countries (Ruan et al. 2015). The authors adapted and translated the questionnaire into Chinese. The original TSES is a nine-point Likert scale including three self-efficacy sub-scales: 1) efficacy for student engagement, which refers to a teacher's sense of ability to motivate their students; 2) efficacy for instructional strategies, which refers to a teacher's confidence in conducting the course; and 3) efficacy for classroom management, which means a teacher's sense of ability to hand the classroom. Each sub-scale contains eight items. One item, 'How much can you assist families in helping their children do well in school?',

Table 1. Demographic information for respondents in the experimental and control groups.

| | Demographic variables | Experimental group | | Control group | |
|------------------------|--------------------------------|--------------------|---------------|---------------|---------------|
| | | Frequency | Percentage(%) | Frequency | Percentage(%) |
| Gender | Female | 25 | 60.98% | 28 | 66.67% |
| | Male | 16 | 39.02% | 14 | 33.33% |
| Teaching experience | Less than 1 year | 24 | 58.54% | 25 | 59.52% |
| | 1–2 years | 15 | 36.59% | 14 | 33.33% |
| | 2–3 years | 2 | 4.88% | 3 | 7.14% |
| | More than 3 years | 0 | 0% | 0 | 0% |
| Teaching subject | General course | 18 | 43.90% | 15 | 35.71% |
| | Vocational course | 23 | 56.10% | 27 | 64.29% |
| Educational background | Secondary vocational education | 0 | 0% | 0 | 0% |
| | Higher vocational education | 1 | 2.44% | 3 | 7.14% |
| | Bachelor's degree | 24 | 58.54% | 26 | 61.90% |
| | Master's degree | 15 | 36.59% | 13 | 30.95% |
| | Doctorate | 1 | 2.44% | 0 | 0% |

was deleted in the adapted version because collaborating with a student's family is not a regular duty of Chinese VET teachers. We used a seven-point Likert scale ranging from 1 (not at all) to 7 (always) to make it easier for novice teachers to make a decision. We applied a back-translation procedure to guarantee that the translated version follows the original meaning of the items. Exploratory factor analysis with varimax rotation showed that all the items were grouped into the original three factors, except two items (factor loading > 0.45 on more than one factor). After deleting the cross-loaded items, the explained variance was 69.66% and the Cronbach's alphas were 0.92 for instructional strategies, 0.94 for classroom management, and 0.92 for student engagement.

We used the planned effort and planned persistence sub-scales from the Professional Engagement and Career Development Aspirations scale (PECDA; Watt and Richardson 2008) to measure the professional engagement of novice teachers. Planned effort indicates how much effort teachers are willing to spend on their work; planned persistence refers to a teacher's will to remain in the teaching profession. The five-point Likert scale of the original version was adapted into a seven-point Likert scale, with 1 = not at all and 7 = always. A back-translation procedure was applied. Exploratory factor analysis with varimax rotation showed that all items were grouped in the two original factors, explaining 81.09% of the total variance. The Cronbach's alpha of the planned effort and planned persistence sub-scales are 0.90 and 0.94, respectively.

Analysis

In order to answer the research questions, two multivariate analyses of co-variance (MANCOVA) were performed with the condition as the fixed factor, the post-test scores on self-efficacy and professional engagement as dependent variables, and the relevant pre-test scores as covariates. The multivariate analysis of variance (MANOVA) was also conducted for both efficacy and professional engagement scales, and then we compared the MANOVA results and MANCOVA results to display the variance explained by the condition. Finally, paired sample *t*-tests were conducted within both the experimental

Table 2. Correlations between all five factors of both pre-test and post-test.

| | Student engagement | Instructional strategies | Classroom management | Planned effort | Planned persistence |
|--------------------------|--------------------|--------------------------|----------------------|----------------|---------------------|
| Student engagement | | .802** | .772** | .526** | .475** |
| Instructional strategies | .678** | | .810** | .590** | .542** |
| Classroom management | .779** | .607** | | .574** | .591** |
| Planned effort | .520** | .355** | .532** | | .750** |
| Planned persistence | .597** | .523** | .599** | .622** | |

Note: Upper part above the diagonal are pre-test correlations, below the post-test correlations

and control group to indicate significant differences between pre- and post-tests. For paired sample *t*-tests we corrected the level of significance for the number of tests (Bonferroni method), which means that the *p*-value was corrected to .017 for the teacher efficacy scale and .025 for the professional engagement scale.

Some preliminary assumption tests were conducted before the MANCOVA analyses. The assumption of homogeneity of variance-covariance matrices was interpreted as non-significant for both teacher efficacy (Box's *M* value = 8.571, *p* = .222) and professional engagement scales (Box's *M* value = 7.271, *p* = .069). Levene's tests of homogeneous error variances of all dependent variables across groups were non-significant (*p* > .05). The authors also examined the homogeneity of regression slopes, which was non-significant for all sub-scales (*p* > .05). For the multivariate normality assumption, the Shapiro-Wilk test indicated that the data did not deviate from a normal distribution (*p* > .05). The correlations between all five covariates (pre-test score) and five dependent variables (post-test score) are presented in Table 2. It shows that most of the factors are not strongly correlated with each other (*r* < .80). The Multicollinearity test shows that VIF of all the covariates in both scales were between 1.973 and 3.769 and tolerance values were between .265 and .507, which is considered acceptable (Hair et al. 2010).

Results

Teacher efficacy

In Table 3, the descriptive statistics for both the pre-test and post-test of each variable are presented. The MANOVA and MANCOVA for both scales were presented in Appendix A and B. The MANCOVA results showed a significant effect of condition on the post-test

Table 3. Descriptive statistics.

| | | Experimental (<i>n</i> = 41) | | Control (<i>n</i> = 42) | |
|--------------------------|-----------|----------------------------------|-----------|-----------------------------|-----------|
| | | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Student engagement | pre-test | 4.76 | 0.75 | 4.77 | 0.53 |
| | post-test | 5.17 | 0.66 | 4.89 | 0.58 |
| Instructional strategies | pre-test | 4.84 | 0.65 | 4.70 | 0.70 |
| | post-test | 5.14 | 0.64 | 5.15 | 0.58 |
| Classroom management | pre-test | 4.79 | 0.75 | 4.71 | 0.82 |
| | post-test | 5.24 | 0.60 | 4.93 | 0.64 |
| Planned effort | pre-test | 5.65 | 0.95 | 5.44 | 0.76 |
| | post-test | 5.79 | 0.72 | 5.58 | 0.62 |
| Planned persistence | pre-test | 5.84 | 0.89 | 5.59 | 1.23 |
| | post-test | 6.21 | 0.61 | 5.86 | 0.78 |

scores of teachers' efficacy (Wilk's $\lambda(3, 79) = .711, p < .001, \eta^2 = .289$) with significant differences for the dimension of student engagement ($F(1, 82) = 15.703, p < .001, \eta^2 = .168$) and classroom management ($F(1, 82) = 14.007, p < .001, \eta^2 = .152$). No significant difference was found between the experimental and control conditions for the dimension of instructional strategies ($F(1, 82) = 1.458, p = .231, \eta^2 = .018$). All three covariates also significantly affected the post-test scores on the teacher efficacy scale in both multivariate tests and tests of between-subject effects (see [Appendix A](#) for the details). Paired-samples *t*-tests showed that teachers in the experimental group scored significantly higher on the post-test than on the pre-test for all three sub-scales, i.e. student engagement ($t(40) = -7.99, p < .001, d = .580$), instructional strategies ($t(40) = -4.28, p < .001, d = .465$), and classroom management ($t(40) = -7.54, p < .001, d = .663$). Teachers in the control group also showed significantly higher scores on the post-test than on the pre-test for student engagement ($t(41) = -2.52, p = .016, d = .216$), instructional strategies ($t(41) = -8.20, p < .001, d = .700$), and classroom management ($t(41) = -3.22, p = .003, d = .299$). These results indicate that teachers' efficacy generally increased during the nine months both in the control and experimental group, but teachers in the experimental group showed a significantly larger effect than the control group for self-efficacy in both student engagement and classroom management.

Professional engagement

[Appendix B](#) shows the results of both MANOVA and MANCOVA for the professional engagement scale. The MANCOVA results showed that the condition had a positive effect on the post-test score for professional engagement (Wilk's $\lambda(2, 78) = .914, p = .031, \eta^2 = .086$) with a significant difference between the experimental and control conditions on the sub-scale of planned persistence ($F(1,82) = 7.248, p = .009, \eta^2 = .084$). No significant difference was found between the experimental and control conditions for planned effort ($F(1,82) = .514, p = .476, \eta^2 = .006$). The pre-test scores also significantly influenced the post-test scores of professional engagement in both multivariate tests and tests of between-subject effects (see [Appendix B](#) for the details). The results of the paired sample *t*-test for teachers' professional engagement showed a similar effect. Teachers in the experimental group showed a significantly higher score on the post-test for planned persistence than the pre-test ($t(40) = -4.54, p < .001, d = .485$), but the difference between pre-test and post-test on planned effort was not significant ($t(40) = -1.95, p = .058, d = .166$). Teachers in the control group also had significantly higher scores in the post-test for planned persistence than in the pre-test ($t(41) = -2.69, p = .010, d = .262$), but the results did not show a significant difference between the pre-test and post-test on planned effort ($t(41) = -1.92, p = .062, d = .202$). The results suggest that teachers in both groups increased the scores on the planned persistence, however, there still is a significant difference between the experimental and control groups. No effects were found with respect to the planned effort.

Discussion and conclusion

This study examined the effects of a TDP on the efficacy and professional engagement of novice VET teachers. It found positive effects for two efficacy sub-scales (i.e. student engagement and classroom management) and one professional engagement sub-scale (i.e. planned persistence).

Effects on teacher efficacy

Concerning self-efficacy, the results indicate that teachers who participated in the TDP significantly improved their efficacy in student engagement and classroom management and did so significantly more than teachers from the control condition. However, their improvement on sub-scale instructional strategies was not significant. This may be explained by teachers' concerns and learning needs. According to Fuller (1969), teachers are mainly concerned about self-protection and self-adequacy in the early phase of their teaching career. The specific issues they need to deal with during this stage are 'class control, subject matter adequacy and finding a place in the power structure of the school and understanding expectations of supervisors, principal and parents' (Fuller 1969, 211). In addition, the context of Chinese VET may also account for teachers' unique concerns because teachers may encounter students having behaviour problems and low learning motivation (Lin, Wei, and Zheng 2005). Novice teachers in such situations probably pay more attention to improving their ability to engage students and manage the classroom, instead of instructional strategies. We thus argue that it is not only how the programme is organised, but also the context and a teacher's learning needs that may influence the effects of TDPs.

The non-significant effect on instructional strategies could also be a result of the specific learning activities conducted in the TDP. Lectures and consultations with expert teachers are the main activities in the current TDP, but they may not be the best way to improve teachers' efficacy of instructional strategies. A case study involving nine junior pre-service teachers conducted by Yurekli, Isiksal Bostan, and Cakiroglu (2020) showed that different training activities in a teacher education programme can affect the various aspects of pre-service teachers' efficacy. According to their study, group work and examinations in a TDP can be regarded as important sources for pre-service teachers to develop their efficacy. The lack of group work and examinations in the current TDP may explain why novice teachers in the experimental group didn't improve their efficacy in instruction significantly more than in the control group in our study.

Effects on professional engagement

This study showed an effect on professional engagement with respect to the sub-scale planned persistence but no effect on the sub-scale planned effort. This means the TDP in the current study improved novice teachers' retention in Chinese VET schools, although it didn't increase teachers' willingness of working harder. Teachers' increase of retention could be related to the programme goals of improving the retention and teaching ability of novice teachers. Some teacher learning activities in the current TDP, such as novice-expert interaction, may be responsible for this effect. According to previous studies, 'peer review of teaching', 'mentoring' and 'teacher learning communities' are effective for keeping novice teachers engaged with the profession (Ronfeldt and McQueen 2017; Whalen, Majocho, and van Nuland 2019). These authors have argued that the experience shared by an expert teacher may help novice teachers to get over difficulties in their teaching practices, and may increase novice teachers' retention.

However, the effort teachers are willing to put into teaching might be affected by other factors. In a study on teacher motivation for the profession, Fokkens-Bruinsma and Canrinus (2012) found that teachers' perception of working conditions, task difficulties and career value are important predictors of their efforts. Fresko, Kfir, and Nasser (1997), based on data from 175 teachers, also found that job satisfaction was the only variable that was directly related to their professional commitment, while other factors, such as professional self-image and pupil grade level were indirectly related. These results indicate that many factors are relevant to teachers' work effort, and job satisfaction seems to be the most important one. However, the poor working conditions in Chinese VET schools, as we introduced earlier, may have a negative influence on teachers' job satisfaction (Hu and Hao 2014; Li 2017). Thus, it might be that TDPs are not very effective in improving a teacher's planned effort unless the weak position of VET in China changes.

Limitations

Since the TDP conducted in our research contains different kinds of learning content (vocational education pedagogy, teacher ethic and teaching practice) and learning activities (lectures, mentoring and lesson observation), it is hard to attribute the change in teachers' efficacy and professional engagement to specific aspects of the programme. Future research might examine the effectiveness of these separate aspects by, for example, comparing various programme alternatives.

Practical implications

An important implication of this study is that the TDP is not effective for all the aspects of teacher efficacy and professional engagement. Novice teachers' learning needs and school conditions may also affect the result of a TDP. For example, the results on efficacy showed that the programme did not improve novice teachers' instructional strategies. Possibly, the novice teachers in the TDP deliberately focused more on the learning content they needed most (such as handling students and managing the classroom instead of instructional strategies). We thus suggest that future TDPs should be more targeted to novice teachers' learning needs to improve the skills they need the most in the early stages of their career. In addition, teachers' instructional strategies should be improved along with their increasing of teaching practices, so we suggest that future TDPs should include more practice-based learning activities, such as teaching demonstrations, lesson study, and joint lesson design.

The results on the professional engagement showed that the current TDP may contribute more to increasing novice teachers' willingness to stay in the teaching profession than to improving their work effort. Based on earlier studies which have shown that job satisfaction and working conditions are important factors affecting teachers' work effort (Fresko, Kfir, and Nasser 1997; Fokkens-Bruinsma and Canrinus 2012), we argue that future TDPs should also focus on novice teachers' perceptions of their work and helping them to handle the heavy workload in the Chinese VET context. For example, teacher educators should share ideas on how to deal with difficult situations in their work and facilitate

novice teachers' reflection on the value of their career. This could provide novice teachers with more sense of worth and control and could make them feel more assured to work with effort on their teaching intentions.

Concluding remarks

After analysing the questionnaires using a pre- and post-test control group design, we concluded that the comprehensive TDP in the context of Chinese vocational education has positive effects in improving novice teachers' retention and their efficacy of classroom management and student engagement. However, this TDP is not effective in improving novice teachers' efficacy of instructional strategies and their work effort. Some possible reasons may be the working conditions and the relevance of the programme in the light of the different learning needs of teachers.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix A: Multivariate tests and tests of between-subject effects for teacher efficacy scale.

| Variable | | Dependent variable | Wilk's λ | F | p | Partial η^2 | Observed power |
|--------------------------|-------------------------------|-------------------------------|------------------|--------|------|------------------|----------------|
| MANOVA | Group | Post-Teacher efficacy | .873 | 3.818 | .013 | .127 | .800 |
| | | Post-Student engagement | – | 4.039 | .048 | .047 | .510 |
| | | Post-Instructional strategies | – | .001 | .980 | .000 | .050 |
| | | Post-Classroom management | – | 5.386 | .023 | .062 | .631 |
| MANCOVA | Group | Post-Teacher efficacy | .711 | 10.283 | .000 | .289 | .998 |
| | | Post-Student engagement | – | 15.703 | .000 | .168 | .975 |
| | | Post-Instructional strategies | – | 1.458 | .231 | .018 | .222 |
| | | Post-Classroom management | – | 14.007 | .000 | .152 | .959 |
| | Pre-Student engagement | Post-Teacher efficacy | .669 | 12.557 | .000 | .331 | 1.000 |
| | | Post-Student engagement | – | 37.493 | .000 | .325 | 1.000 |
| | | Post-Instructional strategies | – | .100 | .752 | .001 | .061 |
| | | Post-Classroom management | – | .537 | .466 | .007 | .112 |
| | Pre-Instructional strategies | Post-Teacher efficacy | .627 | 15.088 | .000 | .373 | 1.000 |
| | | Post-Student engagement | – | 7.915 | .006 | .092 | .793 |
| | | Post-Instructional strategies | – | 42.360 | .000 | .352 | 1.000 |
| | | Post-Classroom management | – | 7.219 | .009 | .085 | .756 |
| Pre-Classroom management | Post-Teacher efficacy | .645 | 13.935 | .000 | .355 | 1.000 | |
| | Post-Student engagement | – | 4.609 | .035 | .056 | .564 | |
| | Post-Instructional strategies | – | .673 | .415 | .009 | .128 | |
| | Post-Classroom management | – | 37.391 | .000 | .324 | 1.000 | |

Appendix B: Multivariate tests and tests of between-subject effects for professional engagement scale.

| Variable | | Dependent variable | Wilk's λ | F | p | Partial η^2 | Observed power |
|----------|-------------------------|------------------------------|------------------|---------|------|------------------|----------------|
| MANOVA | Group | Post-Professional engagement | .939 | 2.576 | .082 | .061 | .500 |
| | | Post-Planned effort | – | 1.907 | .171 | .023 | .276 |
| | | Post-Planned persistence | – | 5.216 | .025 | .061 | .617 |
| MANCOVA | Group | Post-Professional engagement | .914 | 3.648 | .031 | .086 | .657 |
| | | Post-Planned effort | – | .514 | .476 | .006 | .109 |
| | | Post-Planned persistence | – | 7.248 | .009 | .084 | .758 |
| | Pre-Planned effort | Post-Professional engagement | .493 | 40.150 | .000 | .507 | 1.000 |
| | | Post-Planned effort | – | 78.506 | .000 | .498 | 1.000 |
| | | Post-Planned persistence | – | .293 | .590 | .004 | .083 |
| | Pre-Planned persistence | Post-Professional engagement | .377 | 64.582 | .000 | .623 | 1.000 |
| | | Post-Planned effort | – | 4.711 | .033 | .056 | .573 |
| | | Post-Planned persistence | – | 130.291 | .000 | .623 | 1.000 |