Teacher educators' approaches to teaching and connections with their perceptions of the closeness of their research and teaching

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HIGHLIGHTS

- A student-focused approach to teaching is the one most commonly adopted by teacher educators.
- Knowledge transmission is an element of the student-focused approach to teaching.
- Some teacher educators adopt both student- and teacher-focused approaches to teaching.
- Some teacher educators feel confused about their approaches to teaching.
- The student-focused teacher educators experience a close research-teaching relationship.

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ABSTRACT

This study explores teacher educators' perceptions of their approaches to teaching and the closeness of their research and teaching. A total of 115 participants completed a questionnaire. The results showed that these teacher educators perceived information transmission as an element of the student-focused approach to teaching. Three clusters were identified which mirrored different kinds of combinations of the teacher- and student-focused approaches to teaching. The results further revealed that these clusters were related to how closely teacher educators considered their teaching and research to be related to each other.

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1. Introduction

Teacher educators are agents who educate and help student teachers to develop knowledge and competence in the teaching profession. Furthermore, they also act as models that student teachers can observe and imitate (Lunenberg, Korthagen, & Swennen, 2007). Therefore, it is important to explore how teacher educators approach teaching to facilitate student teachers becoming qualified future teachers. Approaches to teaching are complex combinations of teaching intentions and strategies that teacher educators employ when teaching student teachers (Postareff & Lindblom-Ylänne, 2008; Trigwell, Prosser, & Taylor, 1994). Two broad approaches to teaching have been identified: the student-focused approach to teaching and the teacher-focused approach to teaching (Trigwell et al., 1994). Teachers combine these two approaches in different ways according to different teaching contexts and disciplines (Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006; Postareff, Katajavuori, Lindblom-Ylänne, & Trigwell, 2008; Stes & Van Petegem, 2014). Moreover, teachers’ approaches to teaching influence students’ approaches to learning (Trigwell, Prosser, & Waterhouse, 1999). Concerning the situation in teacher education, student teachers’ beliefs concerning teaching have been formed during their previous learning and school experiences before entering teacher education programmes (Berry, 2004; Lortie, 1975). These beliefs influence the ways in which...
student teachers perceive teaching and their facilitation of pupil learning. Thus, the challenge for both teacher educators and student teachers is that student teachers need to consider their teaching beliefs and ways to teach, which are resistant to change once formed (Berry, 2004; Pajares, 1992). Teacher educators’ support for student teachers in terms of their teaching is significant in this process (Nilsson & Loughran, 2012; Rajuan, Beijaard, & Verloop, 2008; Vanasse & Kelchtermans, 2014).

Besides the teaching task, teacher educators are involved in productive research activities. Being active in research is important for teacher educators working in the academic university context, firstly, because high quality research projects and publications are used as evaluation criteria for teacher educators to receive funding and promotion (Geschwind & Broström, 2015). Secondly, research-active teachers have the competence to teach student teachers skills to conduct research (Lucas, 2007; Lunenberg, 2010; Toom et al., 2008). However, there are concerns that teacher educators’ participation in research work would conflict with their involvement in teaching, especially when their research and teaching focus on different issues and are separate activities. It is argued that an integrated relationship between research and teaching is warranted for teacher educators to improve their teaching and to be able to work effectively (Geschwind & Broström, 2015; Robertson, 2007). Thus, the aim of the present study is to clarify how teacher educators perceive the different approaches to teaching and combine the different approaches in a Chinese teacher education context. Further discussion based on teacher educators’ dual roles as teachers and researchers, focuses on how closely they consider their research work and teaching are related in the academic university context. The final argument is on whether their perceptions concerning the closeness of their research and teaching are related to the way they approach their teaching.

2. Theoretical framework

2.1. Teacher educators’ approaches to teaching

Approaches to teaching are defined as strategies that teachers adopt for teaching and the intentions underlying these strategies (Postareff & Lindblom-ylänne, 2008; Trigwell et al., 1994). With 24 university physical science teachers, Trigwell et al. (1994) identified the information transmission/teacher-focused approach to teaching (ITTF) and the conceptual change/student-focused approach to teaching (CCSF). In the ITTF approach, teaching is seen as transmitting knowledge from teachers to students, and it is less connected with students’ deep approach to learning (Trigwell et al., 1999), while in the CCSF approach, teaching is seen as helping students to develop their own understanding of knowledge (Trigwell et al., 1994). There are arguments concerning whether the two approaches can be combined. Trigwell, Prosser, and Ginns (2005) argued that transmission elements of the teacher-focused approach to teaching can be included in the student-focused approach. Thus the student-focused approach to teaching can be seen as a more sophisticated and complete approach than the teacher-focused approach. After exploring the teaching of 97 Finnish university teachers from a wide variety of disciplines, Postareff et al. (2008) concluded that only a minority of teachers adopt an either teacher-focused or student-focused approach, i.e., a theoretically consonant approach to teaching. Most teachers adopt a combination of both approaches, resulting in a theoretically dissonant approach to teaching (Postareff & Lindblom-ylänne, 2011). Further studies showed that the dissonance in teachers’ approaches to teaching is typically related to a development process in which teachers develop from using more teacher-focused approaches towards adopting student-focused approaches to teaching. It takes time to develop teaching to be consistently student-focused (cf. Conway & Clark, 2003; Fuller & Bown, 1975; Postareff, Lindblom-ylänne, & Nevgi, 2007, 2008).

The exploration of what kinds of approaches exist in teachers’ teaching is the first step in the development of their approaches to teaching. This is also helpful in designing the pedagogical training to fit for teachers with the particular approaches (Prosser, Ramsden, Trigwell, & Martin, 2003; Stes & Van Petegem, 2014). Furthermore, the understanding of teachers’ approaches to teaching is closely related to the improvement of their students’ approaches to learning (Prosser & Trigwell, 2014). In a quantitative study, Prosser et al. (2003) found that a dissonant approach to teaching is associated with lower quality learning of the students, while a consonant approach to teaching is related to the improvement of students’ learning.

Approaches to teaching are contextually dependent and may vary according to different teaching context (Prosser & Trigwell, 2006). Moreover, previous research has identified disciplinary differences in approaches to teaching. It has been revealed that university teachers in hard disciplines (such as chemistry and physics) tend to apply a teacher-focused approach to teaching, while teachers of soft disciplines (like history and anthropology; see Neumann, Parry, & Becher, 2002) more commonly adopt a student-focused approach (Lindblom-ylänne et al., 2009). However, there are other studies indicating that disciplines may not always be an influencing factor in the difference in teachers’ approaches to teaching (Stes, Gijbels, & Van Petegem, 2008).

The complicated findings on approaches to teaching require further exploration of the issue in specific fields. In teacher education, studies focusing on teacher educators’ teaching show that teacher educators experience a tension between “telling and growth.” They struggle between teaching through the transmission of propositional knowledge and teaching through the creation of a learning context to develop students’ understanding of knowledge (Berry, 2004). Teaching by “telling” might satisfy teacher educators’ need to transfer information to student teachers, but it does not necessarily satisfy student teachers’ learning needs (Nilsson & Loughran, 2012). Student teachers prefer both teacher-centred features of teacher direction and student-centred features of cooperative learning and knowledge construction (Baeten, Dochy, Stuyven, Parmentier, & Vanderbruggen, 2016). The difficult task for teacher educators is that they need to understand their student teachers’ various learning needs and further adapt their teaching to the preferred learning approaches of the students to create a productive learning environment (Tubić & Hamiloglu, 2009). Student teachers need to be challenged during their pedagogy learning because they need to reconsider their existing knowledge through experience, and teacher educators should engage them in such reflection (Nilsson & Loughran, 2012; Rajuan et al., 2008). Thus, teacher educators’ teaching work is not simply offering student teachers the technical and instrumental knowledge of teaching. It also stresses teacher educators’ support for student teachers to realise the interaction between teaching theory and their own practice, and further, to question their teaching beliefs and practices and involve themselves in a continuous professional development (Vanasse & Kelchtermans, 2014). To make this happen, teacher educators need to apply a variety of educational strategies and approaches to their teaching in a student-focused way, one which encourages student teachers to adopt a deep approach to learning.

Besides the disciplinary contexts mentioned above, it should be realised that cultural influence is complex, and basic concepts of Western educational cogitation need to be reconsidered in the Chinese context (Watkins, 2000). “The paradox of the Chinese learner” (Watkins & Biggs, 1996) indicates that while memorisation
is normally seen as a rote learning method, Chinese learners utilise memorisation as a means to develop their own understanding of the content, which indicates a deep learning approach. This paradox among Chinese learners shows that the surface and deep approaches to learning are culturally and contextually dependent. Thus, it is reasonable to consider that the approaches to teaching are also influenced by the specific teaching and learning context, and a similar “paradox” might exist in Chinese teachers’ teaching as well. In other words, approaches to teaching could be conceived differently in the Chinese educational context. The teacher-focused approach to teaching is common and dominant among university teachers in China (Leung, Lu, Chen, & Lu, 2008). Contradictorily, it has also been shown that Chinese university teachers have a stronger belief in student-focused than teacher-focused teaching (Han, Yin, & Wang, 2015; Hu, Van Der Rijst, Van Veen, & Verloop, 2014). It is argued that Chinese university teachers’ approaches to teaching are developing towards the student-focused (Han et al., 2015). In the discipline of teacher education in China, teaching has been criticised for its teacher-focused and outdated teaching methods and poor effects on developing students’ cognitive creativity and independent learning (Paine, 1995; Zhou, 2014). Thus, in response to the reform of teacher education since the 1990s to educate future teachers with student-focused view of teaching, teacher educators themselves have been required to change their approaches to teaching from the traditional teacher-focused “transmission teaching” to student-focused teaching (Guo, 2005; Paine, 1995; Zhou, 2014; Zhu, 2010).

Several studies have shown that teachers’ approaches to teaching vary between different contexts (Prosser & Trigwell, 2006; Stes et al., 2008; Ubboeleh, Karm, & Postareff, 2016). However, most studies have investigated approaches to teaching in western countries, and few of them have focused on teachers in teacher education. Empirical research exploring teaching in the context of teacher education of China is needed (Guo, 2005), and may shed light on how Chinese teacher educators perceive their approaches to teaching. Both the student- and teacher-focused approaches to teaching have been found in the university teaching context in China in previous studies, however with contradictory conclusions concerning which one is more often applied (Cao, Postareff, Lindblom, & Toom, 2018; Han et al., 2015; Hu et al., 2014; Leung et al., 2008). Furthermore, no previous studies have explored whether the dissonance exists in Chinese university teachers’ approaches to teaching. Meanwhile, as mentioned above, the teaching in teacher education of China, which is in the midst of change, may be related to the adoption of the teacher-focused or student-focused approaches to teaching among teacher educators. In summary, all the findings in previous studies mentioned above provide an initial background to explore the consonant and dissonant approaches to teaching Chinese teacher educators in the present study.

2.2. The role of research in teacher educators’ approaches to teaching

There has been an increasing amount of research on the research-teaching nexus and the significance of the nexus for teachers’ teaching (Coate, Barnett, & Williams, 2001; Elen, Lindblom-Ylanne, & Clement, 2007; Lucas, 2007; Tight, 2016). Research could enhance teachers’ teaching effectiveness. For example, as research-active academics, teachers provide more up-to-date knowledge to students (Coate et al., 2001). Based on the interrelatedness between research and teaching and the positive influence of the research-teaching nexus on teachers’ work and students’ learning, many studies have further discussed the various forms in which teachers implement and strengthen the nexus in practice. For instance, teachers could use the research they work on as information to be transmitted to the students, while they could also use their research as a structural element in the learning process to shape the learning activities carried out by the students. In the latter situation, teachers’ research is incorporated with their teaching in a deeper way and serves as a mode of teaching, students are involved in teachers’ research and participate in the process of knowledge creation with the teachers (Griffiths, 2004). Teachers might relate research with teaching either in an information-transmission way, or in a way that supports deep student engagement (Brew, 2003). The different forms teachers apply reflect their conceptions of knowledge, research and teaching (Brew, 2003; Robertson, 2007). A recent study showed that the more teachers consider their teaching as student-focused, the more important they value the role of research in their own teaching (Hu et al., 2014). However, research and teaching could be independent of each other, or even have a negative nexus (Coate et al., 2001). The conflict between research and teaching could be caused by the limited time and energy of teachers to put in their work (Coate et al., 2001; Pan, Cotton, & Murray, 2014). Furthermore, the university context, policy and supporting strategies for teachers also influence teachers’ perceptions and practice over their research-teaching nexus (Brew, 2010; Hill & Haigh, 2012). For example, research has been highly valued since it is more related to teachers’ academic careers and promotion, though teaching is also an important part of teachers’ academic work. Teachers may have to prioritise research work over their teaching tasks (Geschwind & Broström, 2015). It is important for teachers to keep a balance between research and teaching and to enhance the research-teaching nexus. Teachers’ experience of the nexus varies from a weak relationship to an integrated one (Robertson, 2007). A close and mutually enriching relationship between research and teaching would be helpful for reducing the tension between research and teaching (Geschwind & Broström, 2015; Robertson, 2007).

There has been debate about teacher educators’ role as researchers, how their research influences their teaching and is of benefit to the educational activities in schools and universities in general (Arreman, 2005; Chetty & Lubbén, 2010; Lopes, Boyd, Andrew, & Pereira, 2014; Lucas, 2007; Robinson & McMullan, 2006). Teacher educators not only work as teachers, their research work enhances their academic role as professionals in the field (Lopes et al., 2014; Yoge & Yoge, 2006). Teacher educators conduct research in teacher education (Cochran-Smith, Feiman-Nemser, McIntyre, & Demers, 2008; Cochran-Smith & Zeichner, 2005). Their research could focus on themes such as teaching and learning in school contexts, subject-related research and the pedagogy of teacher education, and it is indicated that their research is mainly qualitative in methodology (Livingston, McCall, & Morgado, 2009; Lunenberg, 2010). Teacher educators have also been encouraged to conduct practitioner research to focus on the educational practice of their own, because it is argued that they can improve their practice directly by conducting research on it (Lunenberg, 2010). Furthermore, teacher educators teach research to their students to provide them with a research-orientation towards their work, understanding of the relevance of the theoretical knowledge in practice, and to develop their pedagogical thinking (Lucas, 2007; Lunenberg, 2010; Toom et al., 2008). Teacher educators are responsible for teaching student teachers about the academic work of a researcher. Meanwhile, teacher educators engage in research-based teaching, meaning that they organise their teaching around inquiry-oriented activities and make educational decisions based on research-based thinking and the competence achieved through research work (Griffiths, 2004; Kynäslähti et al., 2006; Toom et al., 2008).

In the context of teacher education in China, the educational reform launched in the late 1990s has emphasised the importance
of teacher educators regarding their roles both as teachers and as researchers (Zhu, 2010). Though Chinese teacher educators showed a passion for teaching, in line with university teachers in other countries, they experienced conflict between teaching and conducting research (Dai & Goodwin, 2013; Lai, Du, & Li, 2014; Yuan & Lee, 2014; Zhu, 2010). Chinese teacher educators are required to have a PhD, indicating that they have had years of training to conduct research and in academic writing, and they are encouraged to engage in a range of academic activities concerning research, such as academic publications, conferences, and seminars, to publish their research results (Yuan & Lee, 2014). However, sufficient support for them to engage in research work is scarce. Although Chinese teacher educators perceived that their research should be related to their teaching practice, they experienced difficulties in bridging research and teaching (Yuan & Lee, 2014).

As teachers, teacher educators need to be excellent in teaching and consider it to be an important task. Furthermore, the demanding work in teacher education requires them to be reflective and inquiring and to be able to interpret and analyse the educational issues (Robinson & McMillan, 2006), which indicates that research is a necessary task for teacher educators and it should not be separated from their teaching (Livingston et al., 2009; Miles, Lemon, Mitchell, & Reid, 2016). Previous studies from a range of international contexts have stressed the positive influence that arises from teacher educators’ research on their teaching. However, it is unclear whether their perceptions of the nexus between their research and teaching are related to the way they approach teaching.

3. The study

3.1. Aims and research questions

The aim of this study was to gain a better understanding of teacher educators’ perceptions of their approaches to teaching and how their approaches to teaching were related to their perceptions of the closeness of their research and teaching. Firstly, by applying the revised version of Approaches to Teaching Inventory (ATI-R: Trigwell et al., 2005) in the Chinese teacher-education teaching context, the present study examined how teacher educators reported applying approaches to teaching in their everyday practice. Secondly, it investigated the connections between teacher educators’ approaches to teaching and their perceptions of how closely their research was related to their teaching.

The specific research questions and hypotheses were:

1. What approaches to teaching did the teacher educators report adopting?

It was hypothesised that among Chinese teacher educators, who are in the midst of the changing pedagogical environment, both the teacher-focused approach to teaching and dissonant approach to teaching, in which the teacher- and student-focused approaches are combined, could be identified (Cao et al., 2018; Han et al., 2015; Hu et al., 2014; Leung et al., 2008; Watkins & Biggs, 1996).

2. How were the teacher educators’ approaches to teaching related to their perceptions of the closeness of their research and teaching?

It was hypothesised that the student-focused approach to teaching was more intensively associated with a close relation between research and teaching than the teacher-focused approach (Hu et al., 2014).

3.2. Research context

Teacher education in China is mainly offered at teachers’ universities1 (Shi & Englert, 2008). Teachers’ universities generally provide teacher education study as four-year bachelor’s programmes, three-year master’s programmes, and some also have programmes for doctoral studies. The programmes are offered in different faculties and according to the different levels of education and subject knowledge student teachers receive, they become teachers at different levels and subject areas (Li, 2012). The curricula may differ between institutions (Li, 1999). Normally, they contain general education courses, such as political theories and foreign languages; professional education courses, like pedagogy, psychology, and 6–8 weeks of teaching practice; and subject matter courses (Zhou, 2014). Teachers are required to pass a qualification examination to obtain a teaching certificate in higher education institutions to teach at universities (Ministry of Education of the People’s Republic of China, 1995). Since the late 1990s, Chinese teacher education has undergone reform, aiming at launching teacher education curricula as being learner-centred and practice-oriented (Han, 2012; Zhou, 2014; Zhou & Reed, 2005). Meanwhile, teachers’ universities are required to conduct more research. Furthermore, academic publications in prestige journals are seen as one evaluation criterion of the institutions (Zhou & Reed, 2005).

The present study included two teachers’ universities from the northeast part of China. One is a key national teachers’ university and is affiliated with the Ministry of Education, China. This means that the university represents the high quality of teacher education in the country. The other university is under the supervision of the regional education administration and in the same province as the first one, and it is a key provincial teachers’ university. Nine faculties from the two universities were involved, including the Faculties of Education, Arts, Chemistry and Biological Sciences. The programmes included in the study were at the bachelor’s and master’s levels.

3.3. Participants

A total of 115 teacher educators participated in this study (the response rate was 51%). The mean age of the participants was 39 years (SD = 6.42; Min: 26 years; Max: 54 years). Of these, 49 were male (42.6%) and 66 were female (54.8%). Three participants did not report their gender. Among the participants, only one had a bachelor’s degree (0.9%), 35 held a master’s degree (30.4%) and 79 possessed a doctoral degree (68.7%). This meant that almost all of them had experienced professional training in conducting research. Most of the participants (n = 109; 94.8%) mentioned having a formal teaching certification, of which 105 had the teaching certificate in higher education institutions. Furthermore, 111 participants reported their teaching experience, which varied from one to 33 years (M = 12.62, SD = 7.86). Twenty teacher educators (18%) had five years or less of teaching experience. Concerning their workload, 62 teacher educators (53.9%) perceived that teaching occupied 50% or more of their total work time, and that research, administration and other tasks accounted for the rest of their workload. Thirty-eight (33%) thought conversely that research occupied 50% or more of their total work. Eighty-six teacher educators (74.8%) had participated in pedagogical training that ranged

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1. Almost all teacher education institutions at different levels in China have the term “normal university” or “normal school” in their names, which is derived from French (Li, 2010). As “normal university” is not commonly used in the international research context, in this paper, we use “teachers’ university” when we refer to normal university in China.
from three days to 12 months (M = 1.91 months, SD = 2.21). Sixty-one teacher educators (74.4%) had received training of one month or less, twenty-six (22.6%) did not participate in any courses on university pedagogy, and three (2.6%) did not report their situation in terms of pedagogical training.

3.4. Measures and data collection

The data were collected in 2015. The inventory was sent to the participants in either electronic or paper form, according to their preference. All the participants were informed about the nature and aims of the study in the inventory’s instructions. Participants’ submission of the inventory was voluntary and considered as being their informed consent to participate in the study. All personal information was de-identified. Since teacher educators may adopt different approaches to teaching in different course contexts, the respondents were asked to select a specific subject or course and think of a typical teaching situation while answering the inventory.

The Approaches to Teaching Inventory (ATI: Trigwell & Prosser, 2004) and its revised version (ATI-R: Trigwell et al., 2005) have been widely used to investigate approaches to teaching in a range of countries (Goh, Wong, & Hamzah, 2014; Postareff et al., 2007; Stes & Van Petegem, 2014), in Hong Kong (Chiu et al., 2013), China (Han et al., 2015; Hu et al., 2014; Zhang, 2009). In our study, the revised version (ATI-R: Trigwell et al., 2005) was applied since it was an improved version compared with the previous one and the increased number of items from eight to 11 per scale extended the range of the scales (Trigwell et al., 2005). The inventory was translated into Chinese by a Chinese researcher. Each item was compared with the original English item to make sure that the translated item corresponded with the original one. After this, the Chinese version was back-translated into English by two scholars who were fluent in both English and Chinese. The original English inventory and the back-translated version were similar, including only a few word variations that did not change the core meaning of the items. The items were slightly revised based on these differences. ATI-R (Trigwell et al., 2005) includes 22 items (11 items on the teacher-focused scale and 11 items on the student-focused scale). The items were measured on a 5-point Likert scale (“1 = only rarely or never true” – “5 = almost always or always true”). Two items were developed by the authors to explore the participants’ perceptions of the closeness of their research and teaching. The first item asked them about how much they thought their research was related to their teaching. The answer was measured on a 5-point Likert scale (“1 = no link”; “2 = loosely related”; “3 = partly related”; “4 = highly related”; “5 = totally related”). The participants self-estimated the relationship between their research and teaching and chose one from the given choices. In addition, the respondents were asked to estimate the extent to which they consider themselves to be researchers and/or teachers. They provided responses as percentages, ranging from “0% as a teacher and 100% as a researcher” to “100% as a teacher and 0% as a researcher.”

The second item was developed to understand how teacher educators viewed their roles in their professional career concerning their two main tasks as conducting research and teaching.

3.5. Data analyses

Firstly, exploratory factor analyses (principal axis factoring with promax rotation) were conducted to assess the factor structure of the inventory by using the SPSS Statistics 23.0. On the basis of the factor analysis, two scales as the teacher- and student-focused approaches to teaching were created. Afterwards, Cronbach’s alphas of the scales were calculated for reliability analyses. Secondly, the means of the two scales were calculated by the mean of the items. Thirdly, two-step cluster analysis was conducted to classify teacher educators into different groups according to their scores on the two scales of approaches to teaching. Finally, a three-cluster solution was selected. At the end, one-way ANOVA was used to analyse how the three clusters differed from each other in terms of how they perceived the closeness of their research and teaching, and their roles as researchers and teachers.

4. Results

4.1. The factor structure and reliability of the ATI-R

The first aim of the study was to reveal what kind of approaches to teaching the teacher educators reported adopting. Though ATI (Trigwell & Prosser, 2004) and ATI-R (Trigwell et al., 2005) are seen as valid and reliable instruments to explore teachers’ approaches to teaching, Prosser and Trigwell (2006) note that the approaches to teaching are contextually dependent, thus it is important to explore the validity and reliability of the instrument when applied in a new cultural context. Considering the cultural dependency of teaching and learning and the “Chinese paradox” mentioned above (Watkins & Biggs, 1996), the authors of the present study decided to conduct exploratory factor analyses to examine the factor structure of the 22 items from ATI-R (Trigwell et al., 2005) in the present research context.

There are different opinions about how large a sample should be when conducting factor analysis and the recommendations are diverse (MacCallum, Widaman, Zhang, & Hong, 1999), De Winter, Dodou, and Wieringa (2009) recommended that with well-defined factors, exploratory factor analysis with a small sample size can produce reliable solutions. Thus, the authors considered that the sample size of the present study was appropriate for exploratory factor analysis.

Firstly, the items of the ATI-R (Trigwell et al., 2005) were included in the exploratory factor analysis with principal axis factoring and promax rotation in a two-factor solution (the correlation between the two factors was –0.17). It is suggested that factors with eigenvalues of more than 1.0 should be retained, however, this criterion is not accurate, and too many factors are retained by using this method (Costello & Osborne, 2005). The scree test (Cattell, 1966) was used in the study, and the plot of eigenvalues showed that the curve flattened out after a break point of three, thus two factors were retained with the cumulative variance extracted of 36.63%. This means that the two factors together accounted for 36.63% of the total variance. Next, exploratory factor analyses with three and four factors were conducted to ensure the appropriateness of the two-factor solution. The item loading tables of the two-, three-, and four-factor solutions were compared, and the two-factor solution revealed the cleanest factor structure (Costello & Osborne, 2005). Furthermore, considering that our study was based on the two scales of approaches to teaching (Trigwell et al., 1994), and the two-factor solution was the most interpretable, the authors decided to use the two-factor solution in the following analyses. The cut-off for a loading of 0.32 to determine whether an item contributes towards the factor was referenced (Tabachnick & Fidell, 2001).

The results showed that items 4, 15, 21, and 29, which are designed to measure the ITTF approach in the original inventory, loaded to the CCSF scale. In addition, item 20 loaded from the CCSF scale to the ITTF scale. On the CCSF scale, item 15 was left out because of its low communality, and the Cronbach’s alpha of this scale increased when it was left out. On the ITTF scale, item 20 was left out for the same reason. Finally, the CCSF scale included 13 items and the ITTF scale included seven items (Table 1). The three items from the original ITTF scale (4, 21, and 29) which were
included in the CCSF scale are about teachers’ presentation of information or facts to the students.

Items varying from one scale to another indicated that the factor structure of the inventory slightly varied. The three items loading from the ITTF scale to CCSF scale confirmed the interpretation from the inventory’s developers that the CCSF approach is more sophisticated and it could include elements from the ITTF approach (Trigwell et al., 2005). The meaning of teacher- and student-focused approaches to teaching changed in the present research context. The CCSF scale included items representing a student-focused teaching strategy and an intention of changing students’ conceptions of knowledge. The ITTF scale included items representing a teacher-focused teaching strategy and an intention of information transmission. Meanwhile in the present study, the presentation of information for students was also an important element in the CCSF scale.

4.2. Approaches to teaching of teacher educators

After the analysis of the factor structure of the ATI-R (Trigwell et al., 2005), the participants’ mean scores and standard deviations on the student-focused scale (M = 3.87; SD = 0.67) and teacher-focused scale (M = 2.52; SD = 0.69) were calculated. We hypothesised that the teacher-focused approach to teaching and dissonant approach to teaching could be identified among teacher educators. To test this hypothesis, a two-step cluster analysis was used to divide the participants into clusters. A three-cluster solution was revealed with the lowest BIC coefficient of 136.49 and the largest ratio of distance measures of 2.15. The means and standard deviations of each cluster on the student- and teacher-focused approaches to teaching are shown in Table 2 and Fig. 1.

Teacher educators in cluster 1 had similar scores on student- and teacher-focused approaches to teaching. Thus, they were identified as “Teacher educators with a vague approach to teaching.” These teacher educators did not show a clear preference towards either of the two approaches to teaching. Cluster 2 was labelled as “Teacher educators with a dissonant approach to teaching” because they scored not only highly on the student-focused scale, but also the highest on the teacher-focused scale among the three clusters. These teacher educators showed dissonance in their approaches to teaching since they applied both student- and teacher-focused approaches while teaching, though they had a preference towards the student-focused approach compared to the teacher-focused approach. During the teaching, these teacher educators stress supporting the students’ own learning activities and aimed at helping the students to restructure their knowledge. Meanwhile, they also focused on what they do and on delivering the fixed concepts in the textbook to the students to help them to pass the assessment. Teacher educators in cluster 3 scored the highest on the student-focused scale and the lowest on the teacher-focused scale. They clearly had a preference on the student-focused approach to teaching and thus they were named as “Teacher educators with a student-focused approach to teaching.” In adopting the consistently student-focused approach to teaching, these teacher educators showed similarities with cluster 2 in that they also intended to promote their students’ conceptual development in understanding the subject, by encouraging the students’ active participation in learning activities. However, contrary to cluster 2, they did not stress the teacher-focused approach while teaching.

Our second research question was to explore the relationship between teacher educators’ approaches to teaching and how close their research is related to their teaching. Participants were asked about how much they think their research is related to their teaching. More than half of them reported that their research and teaching were highly related or totally related. Around one third thought that their research and teaching were partly related. A minority considered that their research and teaching were loosely related, or that there was no link between them (Table 4).

Teacher educators’ means and standard deviations on the closeness of their research and teaching were calculated based on the three clusters (Table 5).

Afterwards, One-way ANOVA was applied to explore the differences between the three clusters in terms of how close they perceived the nexus between their research and teaching (F (2,112) = 3.10, p = .049). Bonferroni’s post-hoc test (p-value adjusted) showed that teacher educators with a student-focused approach to teaching (Cluster 3) scored significantly higher than teacher educators with a vague approach to teaching (Cluster 1) on the item measuring how strongly teaching and research are related to each other (Table 6). It meant that the teacher educators demonstrating the student-focused approach to teaching emphasised the close relationship between teaching and research in their work. It could also be elaborated that compared with teacher educators with a vague approach to teaching (Cluster 1), teacher educators who employed a consonant approach to teaching (Cluster 3) experienced a close relationship between research and teaching. The partial $\eta^2$ was 0.05, which was seen as a small effect in practical significance (Tabachnick & Fidell, 2001). However, this positive association between the closeness of research and teaching and the teacher-focused approach to teaching was not shown in the study.

Concerning teacher educators’ perceptions of their roles as teachers and researchers, 54 teacher educators (47%) perceived themselves more as teachers than as researchers, 30 teacher educators (26%) perceived themselves more as researchers than as teachers, and 29 teacher educators (25%) thought their roles as teachers or researchers were equal. It was revealed that half of the teacher educators considered themselves mainly as teachers in their professional field. One-way ANOVA was conducted to compare the three clusters concerning the extent to which they considered themselves to be teachers and researchers. However, no differences were shown (F (2,112) = 0.03, p = .966).

5. Discussion

This study explored teacher educators’ perceptions of their approaches to teaching, and the connections between approaches to teaching and their perceptions of the closeness of their research
In a previous study in which the ATI (Trigwell & Prosser, 2004) was utilised to explore the approaches to teaching in the Chinese context, it revealed a four-factor structure model of the inventory (Han et al., 2015). In our study, the exploratory factor analysis of the ATI-R (Trigwell et al., 2005) revealed that three items, which are about teachers presenting information or facts to students, loaded from the ITTF scale to the CCSF scale. This indicated that the factor structure of the inventory in the present study was also different from what had been introduced in previous studies. Offering basic knowledge to the students seems to be related to the other characteristics of the student-focused approach to teaching, rather than to the teacher-focused approach.

This result indicated that information transmission is an element that can be included in the student-focused approach to teaching. However, in the student-focused approach, information transmission is accompanied by student-activating teaching strategies. Teachers applying the student-focused approach to teaching focus on their students’ understanding and construction of knowledge after the presentation of information, not the information transmission itself (Trigwell et al., 2005). Concerning the present study context, offering facts to students as an element of the student-focused teaching could be explained by the research context and “the paradox of the Chinese learner” (Watkins & Biggs, 1996). Contrary to the traditional view that memorising is related to a surface approach to learning and is separable from understanding, Chinese learners see memorising as a means leading to deep learning (Biggs, 1996). Similarly, the present study suggests that Chinese teacher educators’ intention to help students to understand deeply (student-focused approach to teaching) is intertwined with presenting information and facts to the students (teacher-focused approach to teaching). Teacher educators who intend to help student teachers develop their own understanding of a subject may adopt a teaching strategy which focuses on offering the students basic facts and information first.

The approaches to teaching teacher educators reported applying is different from what we expected. We hypothesised that a cluster of teacher-focused teacher educators could be identified, because previous studies showed the existence of the teacher-focused teaching in teacher education in the Chinese context (Paine, 1995; Zhou, 2014). However, in line with studies of Han et al. (2015) and Hu et al. (2014), teacher educators with a strong teacher-focused approach to teaching did not emerge in our study. One explanation could be that participation in our study was voluntary, and therefore the inventories might have been returned mainly by teacher educators who were interested in teaching and thus might be more willing to adopt a student-focused approach to teaching. Further, teacher educators who scored highly on the three items which loaded from the ITTF scale to the CCSF scale in the inventory were now measured as student-focused in their teaching. If these items had remained in the ITTF scale, the results might be different and show more evidence of the existence of the teacher-focused approach. The disciplinary difference could also be an explanation for the no-show of teacher-focused approach to teaching. Leung et al. (2008) conducted the study in the construction engineering discipline (considered to be a hard discipline) and

### Table 1

<table>
<thead>
<tr>
<th>Items</th>
<th>CCSF Loadings on the CCSF scale</th>
<th>ITTF Loadings on the ITTF scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I concentrate on covering the information that might be available from key texts and readings.</td>
<td>.36</td>
<td>.04</td>
</tr>
<tr>
<td>11. I structure my teaching in this subject to help students to pass the assessment of the course.</td>
<td>.41</td>
<td>.10</td>
</tr>
<tr>
<td>13. I think it is important to give students a good set of notes in this course.</td>
<td>.41</td>
<td>.15</td>
</tr>
<tr>
<td>14. In this course, I provide the students with the information they will need to pass the formal assessments.</td>
<td>.36</td>
<td>.06</td>
</tr>
<tr>
<td>25. My teaching in this course focuses on delivering what I know to the students.</td>
<td>.36</td>
<td>.24</td>
</tr>
<tr>
<td>2. It is important that the course is completely described in terms of specific objectives that relate to the assessment of the course.</td>
<td>.44</td>
<td>.07</td>
</tr>
<tr>
<td>3. In this course I try to develop a conversation with my students about the topics we are studying.</td>
<td>.50</td>
<td>.57</td>
</tr>
<tr>
<td>6. I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.</td>
<td>.67</td>
<td>.65</td>
</tr>
<tr>
<td>8. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject they will develop.</td>
<td>.47</td>
<td>.65</td>
</tr>
<tr>
<td>10. In teaching sessions for this subject, I deliberately provoke debate and discussion.</td>
<td>.61</td>
<td>.64</td>
</tr>
<tr>
<td>17. I make available opportunities for students in this course to discuss their changing understanding of the subject.</td>
<td>.59</td>
<td>.67</td>
</tr>
<tr>
<td>18. It is better for students in this course to generate their own notes rather than copy mine.</td>
<td>.38</td>
<td>.50</td>
</tr>
<tr>
<td>23. I see teaching as helping students develop new ways of thinking in this subject.</td>
<td>.53</td>
<td>.58</td>
</tr>
<tr>
<td>24. In teaching this subject it is important for me to monitor students’ understanding of the subject matter.</td>
<td>.37</td>
<td>.53</td>
</tr>
<tr>
<td>27. Teaching in this course should help students question their own understanding of the subject matter.</td>
<td>.39</td>
<td>.47</td>
</tr>
<tr>
<td>28. Teaching in this course should support students in finding their own learning resources.</td>
<td>.53</td>
<td>.49</td>
</tr>
<tr>
<td>(The three items which were originally on the ITTF scale)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. It is important to present a lot of facts to students so that they know what they have to learn for this subject.</td>
<td>.34</td>
<td>.51</td>
</tr>
<tr>
<td>21. In this course my teaching focuses on the good presentation of information to students.</td>
<td>.49</td>
<td>.51</td>
</tr>
<tr>
<td>29. I present material to enable students to build up an information base in this subject.</td>
<td>.57</td>
<td>.56</td>
</tr>
<tr>
<td>ITTF (7 items; Cronbach’s Alpha: .72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. In this course students should focus their studies on what I provide them.</td>
<td>.38</td>
<td>.24</td>
</tr>
<tr>
<td>2. It is important that the course is completely described in terms of specific objectives that relate to the assessment of the course.</td>
<td>.44</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note. CCSF – the student-focused approach to teaching; ITTF – the teacher-focused approach to teaching.

### Table 2

<table>
<thead>
<tr>
<th>Items</th>
<th>CCSF</th>
<th>ITTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1 (n = 25)</td>
<td>2.90</td>
<td>.49</td>
</tr>
<tr>
<td>Cluster 2 (n = 37)</td>
<td>4.08</td>
<td>.45</td>
</tr>
<tr>
<td>Cluster 3 (n = 53)</td>
<td>4.17</td>
<td>.38</td>
</tr>
</tbody>
</table>

Note. CCSF – the student-focused approach to teaching; ITTF – the teacher-focused approach to teaching.
concluded that the teacher-focused approach to teaching is dominant among university teachers in China. However, the present study was conducted with teachers in teacher education, which is considered to be a soft discipline. Teachers in soft disciplines are more likely to employ a student-focused approach to teaching compared with teachers in hard disciplines (Lindblom-Ylänne et al., 2006). Furthermore, it was also elaborated that teacher educators would use student-focused teaching strategies more often than university teachers in other disciplines to support student teachers’ active learning (Goubeaud & Yan, 2004).

The dissonance was revealed in teacher educators’ approaches to teaching in the Chinese context. Teacher educators who reported the dissonant approach to teaching, showed high scores on student- and teacher-focused approaches to teaching and they were more towards the student-focused approach. A similar group of teachers has been identified in previous studies (Postareff et al., 2008). Postareff et al. (2008) applied the word “dissonant” in their study to describe the teaching profiles in which university teachers’ teaching are combinations of both student- and teacher-focused approaches and thus theoretically dissonant. This group of teacher educators could be in a transition phase developing from the teacher-focused towards student-focused approach to teaching.

On one hand, concerning the undergoing reform and changes of teacher education which encourage teacher educators to teach with a focus on students’ learning, and further with the increasing influence of Western pedagogic philosophy, such as developing...
students’ own critical thinking. Chinese teacher educators increasingly tend to apply the student-focused approach to teaching; on the other hand, they still need to face the reality of their teaching context and the influence of traditional Chinese education. For example, the high student-teacher ratio makes it easier for teacher educators to complete their teaching tasks by applying teaching methods such as lecturing. This could also be the reason for the teacher educators who applied the vague approach to teaching, as they may be confused about how to approach their teaching in the complex teaching context.

Our study showed the close relationship between teacher educators’ student-focused approach to teaching and their perceptions of an intensive nexus between their research and teaching in teacher education. This is similar to the result of another study in a Chinese context (Hu et al., 2014) showing that there is a systematic relationship between student-focused teaching and beliefs about the role of research in ideal teaching. Applying a student-focused approach to teaching means that teacher educators focus on students’ understanding and construction of knowledge while teaching (Trigwell et al., 1994), and the results showed that these teachers considered that there was a close relationship between their research and teaching. How teacher educators perceive the research-teaching nexus is aligned with their perceptions of knowledge, research, teaching, and learning (Brew, 1999; 2010). The student-focused teacher educators are more likely to link their research work with their teaching in a student-focused way, as Brew (2002; 2003) has described in the “new model” of the relationship between research and teaching. In this model of research-teaching nexus, knowledge is constructed in a social context, and teachers focus on students’ engagement in research-based activities (Brew, 2003), which is beneficial to student teachers’ achievement in conceptual change and critical thinking. Engaging in research is also a learning process for teacher educators concerning their profession and teaching (Brew & Boud, 1995). These teacher educators may see research and teaching in a mutually reinforcing way. During the teaching process, research functions as a primer to trigger students’ interests; interspersing research with teaching gives teacher educators more opportunities to interact with the student teachers. On the other hand, they may also try to improve their research with the thoughts invoked by teaching. Furthermore, teacher educators with a student-focused approach are the ones who apply a coherent approach in their teaching and research, and they feel fewer negative emotions about improving teaching (Postareff & Lindblom-Ylänne, 2011). Thus, they are more willing to enrich their teaching by integrating research work and teaching.

The study also explored teacher educators’ perceptions of their two roles as teachers and researchers and whether the perceptions varied among teacher educators with differing approaches to teaching. The results showed that though teacher educators have a different tendency towards the student- and teacher-focused approaches to teaching, no difference was shown in their views on their roles as teachers and researchers. The explanation could be that almost half of the participants in the study considered themselves more as teachers than researchers, and there were limited variations between the three clusters on their perceptions of their roles as teachers and researchers. However, the analysis revealed that the teacher educators had different perceptions of their roles when they had different amount of workload concerning teaching and research and belonged to different universities. For all the teacher educators in the study, their perceptions of their roles were consistent with the work they engaged in. To be more precise, the more they focused on teaching, the more they perceived themselves as teachers. Correspondingly, the more they focused on conducting research, the more they perceived themselves as researchers. Furthermore, compared to the teacher educators in the key national teachers’ university, the teacher educators in the regional teachers’ university perceived themselves more as teachers and less as researchers. Teachers’ research-teaching nexus is clearly influenced by the institution’s policy and management strategies (Brew, 2010; Hill & Haigh, 2012). The key national teachers’ university is research-intensive and a model of educational reform to other local universities. The positioning of the university and its developing strategy stressed the importance of conducting research, and the teachers of this university would engage more in research. Thus, this could lead the teachers’ self-perceptions as more of researchers.

In order to enhance teacher educators’ research-teaching nexus, firstly it is vital to know how they define their roles and perceive the closeness between their research and teaching. Teacher educators in the study considered that their main task is to educate the future generation of teachers. Based on that, further discussion about how research could be beneficial for their teaching and integrated to their teaching is needed. Research and teaching are not necessarily in a conflicting relation for teacher educators (Hattie & Marsh, 1996; Robinson & McMillan, 2006). However, researchers have been concerned that factors discouraging the research-teaching nexus may exist (Brew, 2010; Hill & Haigh, 2012). Teacher educators are under the pressure to become research-active and build their researcher identity, which may cause role conflict (Cherry & Lubben, 2010; Colbeck, 1998; Hill & Haigh, 2012). In the context of Chinese teacher education, teacher educators have been encouraged to conduct research and publish academic papers for several years (Zhou & Reed, 2005). While in the present research context, many teacher educators perceived themselves more of teachers than researchers. Thus, there might be a conflict between the institutions’ requirements for teacher educators’ engagement in research work and teachers’ own preference towards teaching. Furthermore, the research-teaching nexus may be seen as self-evident and automatic, and because of this, the need to reflect on and improve the research-teaching nexus might be ignored (Robertson & Blackler, 2006). Teacher educators in the present study considered a close relationship between their research and teaching, nevertheless, this leads us to think in depth about how the research-teaching nexus is actually implemented in their practice.

6. Conclusions

6.1. Methodological limitations and reflections of the study

Firstly, the sample of the study may have been biased because the data were collected on a voluntary basis, and thus it is possible that those who were more interested and concerned about their teaching returned the questionnaire. Secondly, only two teachers’ universities were involved in the study. A sample with broader representation of teachers’ universities would strengthen the transferability of the results. Furthermore, the low correlations between the items of ATI-R (Trigwell et al., 2005) in the present study could influence the reliability and validity of the analysis and indicated that a bigger sample size is required in the future studies. Thirdly, though Chinese university teachers’ approaches to teaching have been explored with the Approaches to Teaching Inventory (ATI; Trigwell & Prosser, 2004), no similar “paradox” in teachers’ teaching or variation in factor structure of the inventory was found (Han et al., 2015; Hu et al., 2014; Zhang, 2009). This might indicate that the findings in the present study were limited to the particular research context and participants. Further work is needed to ascertain the extent to which the results could be generalised. Meanwhile, the results concerning teacher educators’ perceptions of the closeness of their research and teaching and researcher/
teacher role were limited and only presented a general picture, because only two items were developed in the study. Furthermore, the results in the study were based on the participants’ self-reporting and there was limited knowledge of how they conceptualised the issues investigated. Finally, the present study applied a quantitative methodology. Though the ATI-R (Trigwell et al., 2005) showed good reliability and validity in the study, extra caution is needed when interpreting the results, especially when the questionnaire is applied in a new cultural context.

6.2. Implications of the research on future studies

Our study provides new insights into research on teacher educators’ approaches to teaching, which has been scarce. However, more evidence is needed to enrich our knowledge in this area. Firstly, to get a better understanding of teacher educators with a dissonant approach to teaching, interviews and qualitative analyses could be added. Secondly, previous studies indicate that teachers’ pedagogical training could influence their approaches to teaching (Gibbs & Coffey, 2004; Postareff et al., 2007). Unfortunately, in the present study, the limited variation of short training duration restricted us to exploring the relationship between teacher educators’ approaches to teaching and pedagogical training. Thirdly, research exploring student teachers’ experiences and perceptions of their teacher educators’ approaches and practices of teaching in teacher education would be relevant.

6.3. Implications of the research on practice of teacher educators

The ATI-R (Trigwell et al., 2005) could be used to detect teachers’ approaches to teaching and to monitor teachers’ change and development in their approaches to teaching. However, it is important to acknowledge that teaching is dependent on the context, and therefore it is necessary to check the factor structure of the inventory and consider the specific teaching context when applying the inventory. After having an insight into teachers’ approaches to teaching, pedagogical training could be organised for them to further develop their teaching. The training programmes should be tailored to the target group’s actual needs to enhance the impact (Stes & Van Petegem, 2014). For example, in the present study, the student-focused teacher educators stressing information transmission is not necessarily a negative phenomenon. The important task is to improve these teachers’ teaching skills on how to guide student teachers’ active learning and processing of the information. Furthermore, teacher educators with a dissonant approach to teaching might be confused about their teaching and experience more negative emotions than teachers with a consonant approach to teaching (Postareff & Lindblom-Ylänne, 2011). Thus, pedagogical training could be organised for them to develop their teaching to be more student-focused. The training programmes should guide all teacher educators to be reflective, not only on how they approach teaching, but also concerning how their particular approaches to teaching influence the way their students approach learning.

As university academics, teaching and conducting research constitute most teacher educators’ main workload. However, conflicts may occur, for example as shown in the study, between teachers’ self-positioning as more of teachers and the university’s value-orientations for teachers to conduct more research. One suggestion to reduce the conflict would be to build a close relationship between research and teaching both at the institutional and individual level. At the institutional level, universities need to consider their developing strategies first and then provide the teachers with support to encourage their engagement in research and teaching. For example, proper workload should be arranged for teachers to keep a balance between these two tasks. Teacher educators’ efforts to integrate research and teaching could be rewarded by the funding system (Brew, 2003; Colbeck, 1998). Furthermore, universities need to build a scholarly community that does not view teachers separately as the ones who teach and the ones who conduct research (Brew, 2010). Indeed, a community of practice could be built for teacher educators to increase their research capability, especially for those who consider themselves less as researchers. A culture of research and integrating research in teaching in teacher education needs to be encouraged (Hill & Haigh, 2012).

At the individual level, teacher educators need to consider the possibilities to link research and teaching in their everyday work. A deep reflection on their views of research and teaching is needed before they take actions to link research and teaching (Brew, 1999; 2010). Furthermore, teacher educators need to relate research with teaching in a student-focused way, such as involving students in research (Brew, 2002, 2006; Pan et al., 2014). Sufficient support from the university to give individual teachers more control over their own teaching and research would be important. Teacher educators then could decide in which specific ways to link their research and teaching appropriately to make the two tasks not to obstruct each other. For example, they could design the curriculum to involve more of the elements of research in teaching (Brew, 2010). Changes in teacher educators’ perceptions and actions of enhancing the relationship between research and teaching are pivotal, meanwhile challenging (Brew, 2006). All the endeavours to link research and teaching need to build on what teacher educators already have as strength (Robinson & McMillan, 2006), for instance, their perceptions of a student-focused approach to teaching.

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References


