A review of Teacher Efficacy Beliefs Research in the Learner-centred Pedagogy

Context: Themes, Trends and Issues

Abstract

Accompanying the trend of schools moving from teacher-centred to learner-centred pedagogy (LCP) practices, researchers have argued that teachers switching from the one to the other may as a result make changes in their personal judgement of their own teaching competency. This review aims to provide a comprehensive overview of recent studies of teacher efficacy beliefs (TEB) in relation to the LCP context. We have adopted a grounded approach to review 34 published papers between January 2009 and April 2016. Six themes were identified from our analysis of the findings of these studies to delineate how TEB has been studied in the LCP context. By a comparison with other two influential reviews on TEB research, we have also identified three trends and five issues in TEB research in LCP context. Future research directions are proposed with the intent to engage researchers sharing the same interest in this field.

Keywords: teacher efficacy beliefs; teacher self-efficacy beliefs; teachers' sense of efficacy; learner-centred pedagogy; grounded literature review

Introduction

Multiple studies have provided compelling evidences that teacher efficacy beliefs (TEB) are strong predictors of teaching behaviour, of teachers' decisions to stay in the often challenging teaching environment, and of their commitment to the teaching profession in general (Bandura, 1997; Chesnut & Burley, 2015; Dou, Devos, & Valcke, 2016; Henson, 2001; Tschannen-Moran, Hoy, & Hoy, 1998). Additionally, Mohamadi and Asadzadeh (2012) have claimed that there is a relationship between TEB and student learning outcomes, finding that TEB mediated the effect of the sources of efficacy beliefs on student achievement. One issue with many of these studies is that they do not clearly state whether they were conducted in a teacher-centred pedagogy context or a learner-centred pedagogy (LCP) context. Researchers have argued that the process of transforming teaching practice from a teacher-centred to a learner-centred process can be very challenging for teachers in a number of ways. These challenges include: creating learner-centred learning cultures; developing understanding of learner-centeredness; acquiring learner-centred teaching skills; adapting to the changing roles and responsibilities; and balancing students' needs against state demands for standardized teaching (Hung, Ng, Koh, & Lim, 2009; McCabe & O'Connor, 2014; Pedersen & Liu, 2003; Rowell, 1995; Schweisfurth, 2011). Given the complexity of this transformation process, findings from TEB studies (including self-efficacy beliefs and collective efficacy beliefs) in a LCP context might differ from findings in otherwise similar studies in a teacher-centred pedagogy context. Against this backdrop, how do teachers develop their TEB in the LCP context? How are TEB studied in the LCP context? Is there any appropriate instrument to measure TEB in the LCP context? The understanding of how TEB is developed in the LCP context is crucial for researchers and practitioners in terms of supporting the development of TEB in the challenging LCP context.

In this paper, we begin by introducing the concepts of TEB and LCP. This followed by explanation of our method of literature search and our analytical method. After this we present an analysis of the characteristics of the reviewed papers and the results of the synthesis. Then we discuss and compare our findings with previous literature reviews (i.e., Klassen, Tze, Betts, & Gordon, 2011; Tschannen-Moran et al., 1998). Finally, future directions for TEB research in the LCP context are suggested.

Background

The concepts of TEB and LCP are introduced as the background of this review.

Teacher Efficacy Beliefs

Integrated models of TEB, with the related trends and issues of TEB research were put forward by Tschannen-Moran et al. (1998) and Klassen et al. (2011). According to Tschannen-Moran et al. (1998), TEB or teacher self-efficacy beliefs can be characterized by two conceptual strands. The first is grounded in the locus of control theory (Rotter, 1966) focusing on investigating the teachers' locus of control over the learning outcomes. Efficacious teachers perceive student learning outcomes as being determined by the teacher's own efforts, independent of external factors such as the motivation (or the lack of it) of the students. According to this theory, there are two types of efficacy beliefs-personal (i.e., internal control) and general (i.e., external control). General efficacy beliefs relate to the teachers' beliefs in the power of external or environmental factors to influence student learning (Tschannen-Moran et al., 1998).

The second conceptual strand is grounded on Bandura's (1977) social cognitive theory, where human behaviour is impacted by human agency and particularly by the mutual interaction between the three contributors of behaviour, internal personal factors, and external environmental influences. Social cognitive theorists propose two types of expectation. *Efficacy expectation* is the conviction that the individual has the capability to successfully

execute the requisite tasks in order to produce the desired outcomes, whereas *outcome expectancy* is the individual's estimation of the likelihood that performing these tasks will actually lead to the desired outcome (Bandura, 1977). Thus, teachers with high efficacy expectation are confident about their capabilities to perform the teaching tasks well, while teachers with high outcome expectancy are confident that their teaching efforts will actually help students to produce good learning results. The efficacy expectation described in social cognitive theory is commonly seen as equating to teachers' personal teaching efficacy or teachers' self-efficacy beliefs. Personal teaching efficacy can be described as a teacher's belief in his or her capabilities to orchestrate courses of action so as to perform various teaching tasks at a desired level of competence (Bandura, 1977).

Based on these two conceptual strands, Tschannen-Moran et al. (1998) proposed an integrated model of TEB. Figure 1 illustrates the cyclical nature of teacher efficacy beliefs in this model. They conceptualise TEB as a combination of judgment about personal teaching competence together with analysis of teaching task and context (ATTC*)* (see Figure 1, shaded boxes)*.* They contend that ATTC involves judgement of the likely *consequences* of the means or actions (i.e., outcome expectancy in social cognition theory) and the contingent considerations of the supports and challenges in the situated teaching contexts (i.e., general teaching efficacy). This integrated model considers the interaction of personal teaching efficacy (i.e., competency expectation), general teaching efficacy (i.e., contingency) and the outcome expectancy (i.e., the influence of means or actions on the outcome).

In addition, Tschannen-Moran et al. (1998) illustrate the development of TEB (see Figure 1) based on the cognitive process of four *sources of efficacy information* that were postulated and described by Bandura (1997). Enactive mastery experience refers to a successful teaching experience. The vicarious experience is similar to modelling experience, where individual's efficacy beliefs can be affected through observing other colleagues'

successful performance. Physiological arousal refers to the effect of emotions on building efficacy beliefs. Verbal persuasion refers to the receiving of assurance feedback about teaching performance from other members of the social group. These four sources can all influence the development of TEB simultaneously. The *cognitive process* can determine how the sources of efficacy information interact in the formation of TEB. TEB may have *consequences* in relation to setting of goals, investing effort, persistence, and motivation for teachers in their day-to-day teaching work (Tschannen-Moran et al., 1998). These will in turn affect the teachers' performance. It is important to recognise the cyclical nature of TEB in which the teachers' successful performance can create a new mastery experience which can in turn provide new sources of efficacy information to shape future TEB.
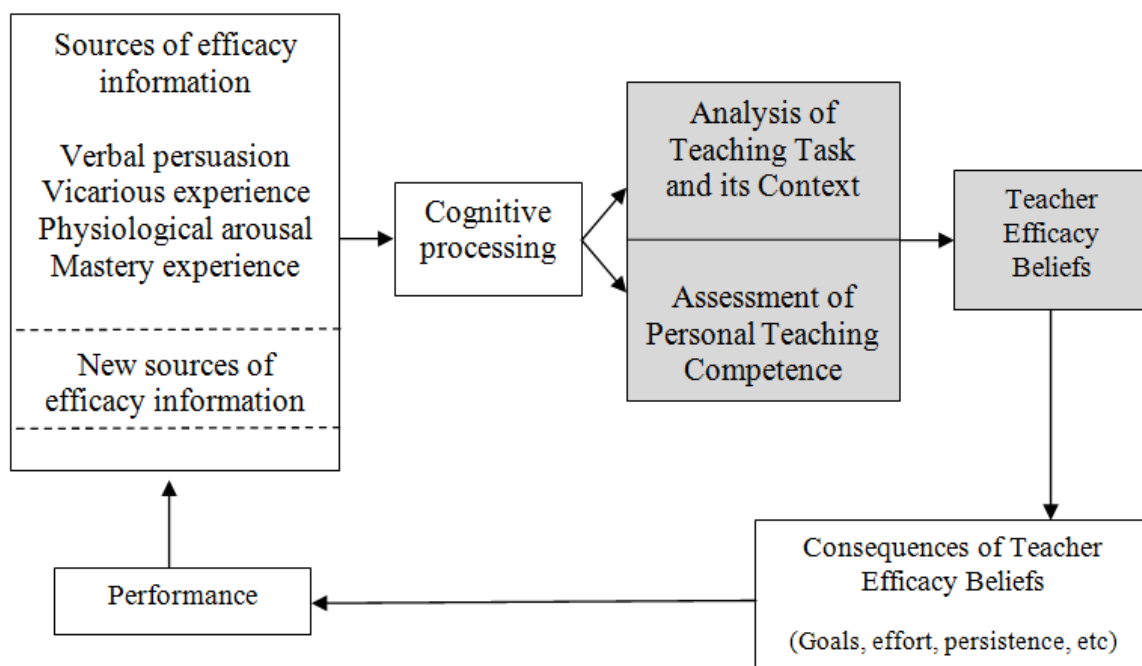

Figure 1. The cyclical nature of teacher efficacy beliefs. Adapted from "Teacher efficacy: Its meaning and measure," by M. Tschannen-Moran, A. W. Hoy, & W. K. Hoy, 1998, *Review of Educational Research*, 68(2), p. 228.

Tschannen-Moran et al. (1998) and Klassen et al. (2011) have identified significant trends and issues in TEB research in their reviews of TEB literature. In 1998, Tschannen-Moran and her colleagues identified four main issues requiring further attention in future research. These were: testing the integrated model of TEB; refining TEB measurement by including both the assessment of personal competence and the analysis of the teaching task and its context; studying the collective efficacy; and understanding the changing nature of TEB. Klassen et al. (2011) identified four trends and four issues in TEB research. The trends related to increases in methodological diversity, research contexts diversity (i.e., internationalization), domain specificity and collective efficacy research. The issues were: the lack of research on the sources of efficacy information, ambiguous measurements of TEB, a lack of studies on links between TEB and student learning outcomes; and the uncertain relevance of TEB research to educational practice. Based on their reviews, we hope to further understand whether or not contemporary TEB research in LCP context shares similar trends and issues.

Learner-centred Pedagogy

LCP can be best understood through a comparison with teacher-centred pedagogy. Teacher-centred pedagogy refers to a method of teaching involving knowledge transmission by teachers. The teachers act as knowledge providers, delivering educational content to the students. It focuses on teacher talks, standardized syllabus, use of textbook materials, and rote learning without collaborative work (Schuh, 2004). In contrast, LCP emphasizes the specific characteristics of the learner and the learning process. Learner characteristics include the learners' experience, background, interests, capacity, and needs. Learning process focuses on finding the most effective pedagogical practices for the learner, those that will help the learner to learn with motivation and learn through constructive collaboration (Lossman & So, 2010; McCombs & Whisler, 1997).

The idea of LCP in this review is based on McCombs and Whisler's (1997) idea that learners are all unique in their emotional states, in their learning styles, and in their abilities, interests, and needs. LCP should therefore address and respect these individual differences in order to provide meaningful learning opportunities for all students. Approaches such as constructivist learning, inquiry-based learning, problem-based learning, authentic learning, transformational teaching and collaborative learning are all considered as a part of LCP (Burden & Byrd, 2013; Westwood, 2008; Yildirim & Kasapoglu, 2015). These approaches aim to make learning meaningful to learners, and to help learners to construct knowledge through active participation in collaborative social settings. LCP also aligns with constructivist learning theory (McCombs & Whisler, 1997; Schuh, 2004; Struyven, Dochy, & Janssens, 2010). This means that learning occurs when learners create their own knowledge through interaction with things that are personally relevant to them.

Review Methods

Scoping

EBSCOHOST databases were searched for peer-reviewed papers written in English and published between January 2009 and April 2016. These databases include Academic Search Premier, Education Research Complete, ERIC, PsycINFO, PsycArticles, and Psycritiques. We chose to start with January 2009 because we wanted to focus on recent development in TEB research, and because two seminal literature reviews (i.e., Klassen et al., 2011; Tschannen-Moran et al., 1998) have already been published relating to the pre-2009 era. The findings of this review can therefore be seen in comparison to these two previous works, in order to understand recent trends and issues in this field.

Two strings of keywords were used in library search. The Boolean search with operator AND was used to combine these two strings of keywords. The first string of keywords was related to TEB. They were: "teacher efficacy", "teaching efficacy", "teachers' self-efficacy", "teacher's self-efficacy", "teachers' sense of efficacy ","collective efficacy", "context efficacy" and "capability efficacy". This string was searched in delimiters of title and abstract. The second string of keywords was used to search for papers related to LCP. They include "learner centred", "student centred", "child-centred", "student-centric", "student oriented". The word "centred" was also spelled as "centered" in the search. Keywords of various types of learner-centred pedagogies were also included, for examples, "teaching for understanding", "democratic education", "authentic learning", "inquiry learning", "problem-based learning", "collaborative learning", "experiential learning" and "constructivist learning".

There were 185 hits. From these we selected 34, based on the following criteria: (a) appeared in peer-reviewed journals, but not in the form of reviews, theses or meta-analyses; (b) discussed issues related to either pre-service or in-service TEB in K-12 LCP context, and (c) used the term "efficacy" to mean efficacy beliefs, rather than effectiveness of intervention. The reviewed studies were indicated with asterisk mark in the reference list.

Data Analysis

A grounded approach was employed to analyse and synthesise the findings of the selected papers. The process started with initial coding, followed by focus coding and axial coding analyses (Charmaz, 2006). In initial coding, main findings or arguments from each study were extracted and given respective codes. For example, Dunn and Rakes (2011) found significant correlation between TEB and learner-centred beliefs. The initial code given to this data was "TEB correlate significantly to learner-centred beliefs". Another example, Chong and Kong (2012) found that lesson study provided the conditions for TEB development that

were emerged in various ways: improvement of content knowledge and application of new pedagogy. Thus, two initial codes were given, such as "growth in content knowledge affect TEB" and "application of new pedagogy affect TEB". During the focus coding, initial codes were sorted into different focus codes based on similarity and relevance. For example, initial codes of "positive correlation between TEB and teacher beliefs about LCP principles" and "positive correlation between TEB and constructivist beliefs" are sorted together and given a focus code of "relationship between TEB and teacher beliefs about LCP". Each focus code was then examined carefully, iteratively and reflexively to ensure that each focus code could be substantiated by the initial codes. This iterative process was to ensure the initial codes were not coded out of the contexts and to ascertain that the focus codes were substantiated by data provided in the respective studies. For axial coding, focus codes were grouped into different higher thematic levels. The focused and axial coding process was conducted through dialogical discussion among three authors. The first author first presented the axial and focus codes to other authors. Then, the second and third authors would examine the clarity, precision and coherency of the codes. The axial codes or themes were revised and refined through discussion with detailed descriptions and evidences from the data. This dialogical process was carried out to improve the trustworthiness of the data analysis. Eventually, six themes were identified. All themes were substantiated with data from different studies which were summarised in Appendix A.

Findings: Characteristics and Six Themes of TEB research in the LCP context

Characteristics of the reviewed studies are presented in Table 1. Firstly, diverse research methodologies were observed. Quantitative methodologies were the most popular approach (16 studies, 47.5%). 8 studies used qualitative methodologies (23.5%), while 10 (29.4%) employed mixed methods. Among the quantitative and mixed methods studies, various instruments were employed. These included task-specific scales, such as Teacher Sense of

Efficacy Scale (TSES); and domain-specific scales such as Science Teaching Efficacy Beliefs

Instrument (STEBI). Other instruments were designed to measure TEB in specific contexts

such as TEB in using technology in teaching, and TEB in collaborative teaching. Secondly,

23 studies (67.6%) were domain specific with different foci on science and mathematics,

language, and physical education. Thirdly, research contexts varied across a diversity of

regions, including North America, Oceania, Asia, Europe and the Middle East. Finally, the

research settings covered different teaching levels, ranging from pre-schools to high schools.

Table 1

Quantitative description of the characteristics of reviewed papers

Characteristics	Description	No. of papers	% of papers
Mode of inquiry	Quantitative	16	47.5
	Qualitative	8	23.5
	Mixed	10	29.4
Quantitative Instruments (n=26)	STEBI/MTEBI (domain specific)	10	38.5
	TSES(tasks specific)	8	30.8
	Others	8	30.8
Domain	Science/ Mathematics	18	52.9
	Physical education	3	8.8
	Language	2	5.9
	Not specified/mixed	11	32.4
Region of study	North America	13	38.2
	Europe	8	23.5
	Asia	5	14.7
	Middle East	3	8.8
	Oceania	2	5.9
	Others	3	8.8
Teaching level	Elementary school	13	38.2
	Intermediate/High school	8	23.5
	Pre-school	2	5.9
	Not specified/Mixed	11	32.4

Note: STEBI= Science Teaching Efficacy Beliefs Instrument; MTEBI= Mathematic
teaching Efficacy belief Instrument; TSES= Teacher Sense of Efficacy Scale.

The identified themes were: (a) TEB and experiences, (b) TEB and emotions, (c) TEB

and resources, (d) TEB and teacher knowledge, (e) TEB and teacher belief about LCP and (f)

TEB and (intended) enactment of LCP. These six themes illustrated how TEB was studied

and developed in the LCP context. The following sections elaborate each of these six themes.

TEB and Experiences

The reviewed studies mentioned in this theme show that TEB can be affected by both enactive mastery experience and vicarious experience. These two types of experiences are discussed in two separate sections below.

   Enactive mastery experiences. Enactive mastery experience usually refers to successful authentic and enactive experiences that teachers have through their teaching and learning activities (Bandura, 1997). In this section, we first report the studies that found TEB developed by teaching experiences, followed by the studies that found TEB developed through learning experiences.

   TEB can be developed from teachers' enactive mastery experience through teaching either inside or outside schools. An experienced science teacher in Thomson and Gregory's (2013) study felt very confident about her ability to teach according to the education reform and attributed her high TEB in LCP to her previous success in improving students' learning outcomes. The education reform required teachers to use LCP (i.e., the use of inquiry-based learning and authentic activities) to improve students' conceptual understanding in science. Meanwhile, another teacher in the same study felt a lack of confidence in implementing LCP due to lack of relevant experience. Ford et al. (2013) found that teachers perceived themselves as being competent as a result of their positive experiences in a day care program and a science camp (i.e., informal education outside school). Similarly, teachers in Bursal's (2012) study reported that their previous informal teaching experience helped them to develop more confidence to teach LCP-based science. Furthermore, self-reported LCP enactive mastery experience was found to be positively correlated to TEB (Cobanoglu & Capa-Aydin, 2015; Gorozidis & Papaioannou, 2011; Nie, Tan, Liau, Lau, & Chua, 2013). For example, Nie et al. (2013) found that teachers with higher sense of efficacy beliefs reported more frequent use of constructivist or LCP in their teaching.

Apart from the TEB of individuals, collective TEB can also be improved through enactive mastery experience. Collective TEB usually refers to a group of teachers' shared beliefs in the group's capabilities to execute the courses of actions required to meet a certain level of attainment (Bandura, 1997). Horton and Martin (2013) found that the school leaders and teachers developed a sense of collective efficacy, collaborative spirit, and collective responsibility for student learning through participation in the professional learning community.

In addition to teaching experience, teachers' learning experiences may also improve their TEB. These learning experiences include learning experiences in professional development, teacher education, and learning experience as students before they become teachers. Learning experiences in professional development and teacher education include field trips, collaborative learning, and community of practices. For example, teachers gained TEB after their successful experiences of LCP learning during field trips (Bursal, 2012; Duran, Ballone-Duran, Haney, & Beltyukova, 2009; Flores, 2015; Leonard, Barnes-Johnson, Dantley, & Kimber, 2011; Liang & Richardson, 2009; Moseley, Huss, & Utley, 2010; Nuangsaeng, Ketpichainarong, Ruenwongsa, Panijpan, & Niemi, 2011). In the study carried out by Duran and colleagues (2009), the teachers felt more confident because they were able to ask inquiry-based questions and to explain scientific concepts clearly during the field trip. Leonard et al. (2011) also found that teachers reported higher TEB after their enactive learning experiences on a field trip, as they gained more experience working with students in the community-based programme.

Besides field trips, collaborative learning also provided enactive learning experiences for teachers to develop their TEB. This collaborative learning could be provided through co-teaching practices (Bruce & Flynn, 2012), lesson study (Chong & Kong, 2012) and community of practices (Horton & Martin, 2013). For example, in Bruce and Flynn's (2012)

study, teachers felt empowered as they made instructional decisions together in a safe and supportive environment. They were able to identify appropriate LCP strategies that helped overcome students' learning difficulties. As a result of this, the teachers were able to conduct challenging lessons successfully, which in turn enhanced their TEB. Likewise, the teachers who participated in a lesson study through collaboration (Chong & Kong, 2012) found that the success of this experience improved their TEB. Teachers' personal learning experience also helped to shape their TEB. Participants in Mansfield and Wood-McConney's (2012) study described how experiences such as doing science at home or participating in a science community had made them feel confident in conducting LCP. Similarly, teachers who had more hands-on experience with computers tended to feel more confident about including video games and technology in LCP (Annetta et al., 2013).

Vicarious experience. Teachers may also gain TEB from vicarious experiences. These can come, for example, through video-based teacher training and teaching observation. Thus, Alsawaie and Alghazo (2010) and Sang et al. (2012) found teachers who learnt through observing video cases demonstrated significant higher improvement in TEB as compared to teachers in the control group. Teachers in the video-based group watched more videos on effective teaching than did the control group. These videos demonstrated effective LCP, such as strategies for student active learning and techniques for engaging questioning. Duran et al. (2009) found that the teachers' TEB was improved after they heard and watched scientists, science educators, and experienced teachers demonstrating effective inquiry methods. Mansfield and Woods-McConney (2012) found that the teachers were encouraged, and thought that they could achieve similar success, after they observed other teachers' success in LCP teaching. Similarly in the Chong and Kong's (2012) study teachers reported greater TEB in their interviews after observing their colleagues' teaching using inquiry methods.

TEB and Emotions

Research showed that positive emotions are an important source of efficacy information for the development of TEB (e.g., Mansfield & Woods-McConney, 2012; Nuangsaeng et al., 2011). These positive emotions include feelings of joy, pleasure, and satisfaction. TEB could be improved when teachers experience positive emotions in implementing LCP. For example, teachers experienced joy and pleasure at seeing students developing a positive learning attitude and improving their inquiry skills during the learning process (Mansfield & Woods-McConney, 2012; Nuangsaeng et al., 2011). Nuangsaeng et al. (2011) found the teacher in their study was impressed (i.e., positive feeling of satisfaction) that students were able to perform scientific techniques even before the students had been taught explicitly by the teacher how to do them. These positive emotions gave the teacher a greater sense of confidence in her teaching. Similarly, teachers in Chong and Kong's (2012) study experienced a sense of satisfaction (i.e., a form of positive emotions) from observing a higher level of student engagement in the LCP lessons, which then helped the growth of their TEB. Participants in Mansfield and Wood-McConney's (2012) study also claimed that a positive emotion such as simply feeling relaxed was important in helping teachers to feel a more positive TEB during implementation of LCP.

TEB and Resources

TEB may improve when adequate resources are made available to teachers. These resources can include teaching materials, time and human resources. Thomson and Gregory (2013) reported that two relatively inexperienced teachers said that teaching kits helped them to feel more confident in their teaching. They felt that these resources had helped them to engage with learners when they did not have the time to design LCP learning activities. Besides the teaching kits, internet teaching resources also helped student teachers to have a successful teaching experience and thereby develop their TEB (Liang & Richardson, 2009). Meanwhile,

both preservice and in-service teachers who were new to aspects of LCP such as inquiry-based teaching felt frustrated and lacked confidence when they were not able to access appropriate materials for LCP activities (Nuangsaeng et al., 2011; Soprano & Yang, 2013).

Apart from teaching materials, adequate time was also an important resource for teachers to develop their TEB. Gurvitch and Metzler (2009) found in their study that student teachers needed time to develop their TEB after they were introduced to authentic teaching. Their TEB were improved gradually over the course of an entire semester of teaching practice and courses. In a few studies, teachers reported having insufficient time for planning and conducting LCP. The lack of time resulted in poor quality of implementation and eventually weakened their TEB (Chong & Kong, 2012; Wyatt, 2010). Moseley et al. (2010) found that teachers who reported being challenged by lack of time for implementation made little improvement in TEB.

In addition to teaching materials and time, human resources such as sharing of expertise are helpful in developing TEB. For instance, teachers reported a gain in TEB after they shared expertise through collaborative teaching (Bruce & Flynn, 2012; Chong & Kong, 2012). Similarly, in a case study, the teacher improved her TEB after she received help from researchers (i.e., experts) to improve her lessons (Nuangsaeng et al., 2011). Richter et al. (2013) found a significant positive correlation between TEB and support from a mentor. New teachers who scored higher in their TEB reported that they had received more help and support from their mentors than had the ones who scored lower in TEB.

TEB and Teacher Knowledge

The impact of teacher knowledge on the development of TEB is still debated. Teacher knowledge is taken to include content knowledge (CK), pedagogical content knowledge (PCK) and knowledge about students.

Content knowledge and pedagogical content knowledge. Some studies found TEB improved as teacher expanded their CK and PCK (e.g., Bruce & Flynn, 2012; Duran et al., 2009; Wyatt, 2010). Through the interview data, Duran et al. (2009) found that teachers attributed their gain of confidence in teaching science to attending seminars and field trips, which improved their understanding of inquiry-based teaching (i.e., PCK). By using interviews and classroom observation to analyse the degree of fit between qualitative description of TEB and teacher used of knowledge, Wyatt (2015) found that the growth of TEB was related to the growth of teacher knowledge. Interview data from other studies also showed that teachers developed their TEB when they improved their PCK in collaborative learning programs (Bruce & Flynn, 2012; Chong & Kong, 2012) and action research (Soprano & Yang, 2013; Wyatt, 2010).

It is important to note that the development of TEB can still take place in spite of teachers' misconceptions (i.e., inaccurate CK). For instance, pre-service elementary teachers in Bursal's (2012) study reported a gain in confidence even though most of them still held misconceptions about various aspects of the science.

However, negative or non-significant correlations between TEB and teacher knowledge were found when teachers were overwhelmed by excessive new knowledge. For example, Ertmer, Schlosser, Clase, and Adedokun (2014) found a non-significant correlation between teachers gain in CK, problem-based learning knowledge (i.e., PCK) and TEB after an intense teacher learning program. Furthermore, McCormick and Ayes (2009) and Cohen and Zach (2013) found a negative correlation between teacher knowledge and TEB. Teachers in Cohen and Zach's (2013) study demonstrated a decline in their TEB after they studied the new PCK in cooperative learning. Similarly, Leonard and his colleagues (2011) also found that TEB in teaching science was not dependant on their CK and PCK. Interviews and classroom observations showed that teachers struggled to learn the CK and to incorporate

inquiry-based PCK into teaching. Classroom observation indicated only moderate use of inquiry-based teaching. In spite of poor improvement in knowledge, the teacher still reported a gain in her TEB. Similarly, another case studied by Wyatt (2015) showed that the teacher still reported a gain in TEB when there was limited evidence of teacher knowledge growth.

   Knowledge about students. Knowledge about students affects the development of TEB. Bruce and Flynn (2012) found that teachers gained knowledge about students' learning trajectories when they saw their students gaining confidence and understanding in their mathematical discussions and classroom talk. In another study (Leonard et al., 2011), highly efficacious teachers had a greater understanding of their students' prior knowledge and background than did other teachers. The teacher who scored the highest in science teaching outcome expectancy (a subscale of TEB) had very extensive knowledge of her students.

TEB and Teacher Beliefs about LCP

There is a significantly positive correlation between TEB and teacher beliefs about LCP. A significant correlation has been found between teacher beliefs about LCP and TEB in classroom management, instructional strategy, and student engagement. Teacher beliefs about LCP were measured as beliefs in learner-centeredness principles in Dunn and Rakes (2011) and as beliefs in constructivist teaching in Cobanoglu and Capa-Aydin (2015). Gürbüztürk and Şad (2009) found that teacher beliefs about constructivist teaching correlated significantly with TEB in student engagement, but not in classroom management or instructional strategies. Ruys and her colleagues (Ruys, Van Keer, & Aelterman, 2010, 2011) found a significant correlation between TEB in conducting collaborative learning and the teachers' level of belief in the collaborative learning (i.e., a form of LCP). Teachers who rated more highly in TEB also had a higher expectation and attached a higher value to, collaborative learning.

TEB and (intended) Implementation of LCP

A high level of TEB may in turn lead on to implementation of, or an intention to implement

LCP. For the purpose of this review, LCP implementation refers to a teacher's shift to LCP

teaching *after* a teacher training programme. This is slightly different from teachers' enactive

experience *during* teacher learning programs, as was mentioned under "TEB and

experiences".

Correlational studies found correlation between TEB and intention to implement LCP

in varying degrees. Teo (2009) found that not all aspects of TEB correlated significantly with

the teacher's intention to enact LCP. In his study, TEB in using technology were measured on

three aspects: TEB in basic technology skills, TEB in advanced technology skills and TEB in

technology for pedagogy. TEB in their own basic technology skills and in their ability to use

that technology for pedagogy were good predictors of their intention to use technology in

constructivist teaching (i.e., a form LCP). However, TEB in advanced technology skills was

not a significant predictor of their intention of using technology in constructivist teaching.

Gorozidis and Papaioannou (2011) found that only TEB in carrying out daily teaching plans

could directly predict the teacher's intention to implement the LCP curriculum in the

following year. Other aspects such as TEB in LCP teaching and TEB in promoting students'

self-regulation were unable to predict their intended enactment of LCP curriculum directly.

Intervention studies showed that positive TEB may lead to implementation of LCP

(Bumen, 2009; Nuangsaeng et al., 2011; Temiz & Topcu, 2013). For example, Bumen's

(2009) study found that teachers reported a significant gain in TEB after a year-long intensive

professional development program. 38 in-service teachers across the range from kindergarten

to secondary school levels from a same school participated in this study. Lesson observations

after the program revealed a substantial increase in LCP activities in classes, such as teachers

asking more open-ended questions and arranging more group activities for students.

According to the group interview, teachers reported that the professional development program improved their confidence. Teachers said that with this new confidence   they found it easier to come up with innovative ideas and felt more empowered to adopt LCP in classroom. The impact of TEB on the implementation of LCP can be carried forward into future teaching. Nuangsaeng et al. (2011) found that the teacher in their study not only demonstrated great commitment to implementing LCP immediately after intervention, but she also successfully implemented more LCP lessons in the following semester. Similarly, classroom observation in Temiz and Topcu's (2013) study provided evidence showing that highly efficacious teachers implemented more and better LCP approaches in microteaching. Nevertheless, the work by Ford, Fifield, Madsen, and Qian (2013) found that this increased TEB did not necessarily contribute to teachers' intention to implement LCP, due to the challenging requirements of this pedagogy.

In summary, TEB research in LCP context shows that teacher experiences and teacher emotions are important sources of efficacy information for the development of TEB. TEB can be improved by the provision of resources in their teaching environments. TEB is positively correlated to teacher beliefs about LCP. However, how TEB is related to teacher knowledge, teacher's intention to implement and actual implementation of LCP is not yet clear.

Discussion

In this discussion we concentrate on making a comparison between our findings and the previous reviews (Klassen et al., 2011; Tschannen-Moran et al., 1998) and the integrated model of TEB (Tschannen-Moran et al., 1998). We start by discussing the trends and issues that we have identified. These are generally similar to those noted in previous TEB studies, but there are also some new developments relating to the LCP context that need to be considered. After this we will go on to propose that teacher knowledge to be included in the integrated model. Then, we discuss the need for more detailed investigation of the

relationship between TEB and analysis of teaching task and its context (ATTC), as well as of the social aspect in TEB development.

Trends and Issues

In our analysis we have identified three trends. Firstly, a trend towards increased diversity in methodology was found in the literature. Besides the previously prevalent quantitative research, reviewed studies also adopted qualitative and mixed methods. Secondly, there was a trend towards diversity in research contexts. Researchers recognised the context-dependency nature of TEB—that is TEB may be different in different contexts. For this reason more studies explored TEB in different contexts, across different regions and at different teaching levels. Finally, researchers have been exploring TEB in specific subject domains rather than in general teaching context. We recognised these as being trends, since similar characteristics were appeared and discussed in the review conducted by Klassen and his colleagues (2011) and these trends remain relevant in the LCP context. In addition, the identified themes in TEB research deepened our understanding of the complex nature of TEB in LCP context, where it is related to teacher's experiences, emotions, beliefs and knowledge. Meanwhile, the external aspect such as resources also shapes the formation of TEB.

We have identified five specific issues that require more attention from researchers. Firstly, apart from the work of Horton and Martin (2013), there is a lack of research into collective efficacy beliefs in the LCP context. In fact, as observed by Klassen et al. (2011), there has been a lack of attention paid to collective efficacy in TEB research in general, not just that relating to LCP. Collective efficacy beliefs are the beliefs about the collective capabilities of the group to which they belong (Bandura, 1997). Teachers encounter various challenges in changing the style of teaching pedagogy (McCabe & O'Connor, 2014; Schweisfurth, 2011). To overcome these challenges and achieve a successful transformation requires a collaborative effort. For this reason, research on collective efficacy beliefs is

needed. This will help us to understand how teachers may be influenced by their colleagues' collective capacity to cope with challenges, and may be motivated to make changes in school collectively. We agree with Klassen and his colleagues (2011) that qualitative inquiry and longitudinal design could help us to understand the formation and contextual influence on teachers' collective efficacy beliefs.

Secondly, the link between TEB and learning outcomes in the LCP context has not been explored. We found none of the reviewed studies looking at this relationship. This unexplored link has also been addressed by other researchers (Klassen et al., 2011: Wheatley, 2000). Wheatley (2000) even argued that positive TEB could be an obstacle to educational reforms. He argued that teachers may hold positive but unrealistic TEB. They may ignore student learning by just continuing with the usual ways of teaching if they feel confident in carrying this through. There is a need to investigate and establish the relationship between TEB and student learning outcomes.

Thirdly, there is a lack of empirical evidence on the effect of TEB on teaching practice. Contrary to Klassen et al. (2011) who postulated that studies on the sources of efficacy information could improve TEB and that improved TEB could improve teaching practices subsequently, in this review we did not see the clear link between TEB and teaching practices. Many reviewed studies integrated sources of efficacy information and provided extensive information about effective ways to foster TEB through teacher learning programs, but they did not look into the effect of TEB growth on classroom practices. Some teacher learning programs emphasised the provision of mastery and vicarious experiences to teachers, creating constructive learning experiences and positive emotions in the TEB development process (see details in the sections of "TEB and Experiences" and "TEB and Emotions"). In some of the reviewed studies, it was reported that verbal or social persuasion is also an important element in TEB development and could be strategically embedded in collaborative

activities (see Chong & Kong, 2012; Liang & Richardson, 2009; Mansfield & Woods-McConney, 2012). However, we found insufficient description or discussion of the influence of verbal or social persuasion in those studies for us to develop an insightful theme in our analysis. This does not mean that we disagree with the authors on the potential influence of verbal persuasion on TEB development. Instead, we suggest that with more studies that focus on social interaction on TEB development in the future, more nuanced understanding of verbal persuasion can be found.

There is still a lack of clarity about how TEB influences day-to-day classroom practices. Teachers' intention to implement LCP may be a good indicator of possible changes in classroom practices. In our analysis, we found some researchers have claimed that TEB was a significant influence on teacher's intention to implement LCP (Gorozidis & Papaioannou, 2011; Teo, 2009). However, when we scrutinised their analysis we found that a significant correlation was only found in some, but not all dimensions of TEB (see details in the sections of "TEB and (Intended) Implementation"). For example, Gorozidis and Papaioannou (2011) found that only TEB in carrying out daily teaching plans could predict a teacher's intention to implement LCP. Other types of TEB, such as TEB in LCP teaching, were unable to predict whether the teacher actually intended to implement LCP. The correlational studies usually did not provide sufficient information to understand the possible reasons for such inconsistent and non-conclusive correlation. Furthermore, it is under debate whether positive TEB will inevitably lead to LCP implementation (Wheatley, 2002). A challenging teaching environment may hinder LCP implementation even when the teacher is highly efficacious (Ford et al., 2013). We can only suggest TEB may lead to actual implementation of LCP due to the lack of conclusive results. More studies are needed to investigate what are the other factors that may influence the full development of TEB and subsequently lead to implementation of LCP.

Fourthly, there is still no consistent measurement of TEB. We found that the reviewed studies employed a variety of different instruments to measure TEB. These instruments varied not only in detail but also in concept, as argued in Klassen et al. (2011) and Tschannen-Moran et al. (1998). The two most frequently used instruments are STEBI and TSES (see Table 1), but these are not actually measuring the same thing. If TEB is being measured with different instruments that are focused on different skills and contexts, it may not be possible to draw firm conclusions about the relationship of TEB to other factors. In addition to this, Tschannen-Moran and Hoy (2001) have highlighted the challenges in developing instruments that could fulfil the demands of context specificity and generability of the instrument at the same time. The limitations implicit in quantitative measurement have also been addressed by other TEB researchers (Labone, 2004; Wyatt, 2014).

Finally, there is still no good qualitative inquiry into TEB in the LCP context. Although there is diversity in methodology in TEB studies, our analysis shows that TEB studies in the LCP context are still predominantly quantitative in nature. In this conclusion we are in agreement with Klassen et al. (2011) and Tschannen-Moran et al. (1998) that more qualitative inquiry and diverse research methodologies are needed for further understanding of the development of TEB.

Future Directions

We suggest three future directions for TEB research in the LCP context, in the hope that future research may improve our understanding of the development of TEB.

Firstly, although the relationship between teacher knowledge and TEB has not clearly established, we would argue that teacher knowledge needs to be considered in the conceptualisation of TEB. Teacher knowledge was not mentioned in the reviews of Tschannen-Moran et al. (1998) and Klassen et al. (2011), but our analysis showed that more recent researchers have now started to take an interest in this relationship. Fives (2003) and

Wyatt (2016) both contend that teacher knowledge and TEB are deeply entwined. They are clearly associated with one another, though the exact nature of the relationship is unclear. More research on this relationship may bridge the current research gap developing due to changing teacher practices. Fives (2003) reminds us that TEB on their own are not sufficient to change teaching practices. TEB can be the intermediary between teacher knowledge and teaching action, influencing the effort that the teacher puts into applying his knowledge to his practice. On the one hand teacher knowledge seems to be a part of the cognitive process by which teachers assess their TEB. For example, Wyatt (2016) found that TEB seen in relation to teacher knowledge helped to clarify the nature of the TEB, as well as influencing teacher decisions about their own learning and teaching effort. On the other hand, it can be viewed as additional sources of efficacy information. Based on Wang, Tan, Li, Tan, and Lim (2016), teachers' knowledge about their students made them felt efficacious in teaching.

In line with our proposal of incorporating teacher knowledge into the conceptual model of TEB, we agree with Fives (2003) that there is a need to continue to investigate the relationship between teacher knowledge and TEB which beyond their correlational relationship. This includes understanding how teachers perceive their own knowledge when they assess their TEB. Future study may need to focus on the roles and influences of teacher knowledge in TEB development and on how teacher knowledge can be positioned in the conceptualization of TEB development.

Secondly, we suggest the need to investigate contextual influences on TEB development. This can be done by unpacking the process of analysis teaching task and its contexts (ATTC), in order to understand how it is related to TEB. Tschannen-Moran et al. (1998) highlighted the contingent aspect of TEB that is rarely studied. In their seminal work, they proposed that the construction of TEB may include both the assessment of personal competence and an analysis of the teaching task and its context (i.e., the contingent aspect of

TEB). They called in 1998 for further investigation to test out this integrated model; yet our review shows that there is still no empirical study investigating the process of ATTC and its relationship with TEB. ATTC includes the evaluation of task difficulty in relation to the anticipated teaching situation. Teachers will evaluate what means are required to accomplish the task and whether they have the ability to carry it through to completion (Tschannen-Moran et al., 1998).The understanding on how ATTC can influence TEB may help us to understand the development process of TEB and contextual influences in TEB. For example, we may be able to understand what are the key considerations in ATTC that would affect TEB, as well as what are the contextual aspects in ATTC that will shape TEB in the evaluation process. One implication of this understanding might be to encourage educators and researchers to improve the design of pre-service teacher education courses and teacher training courses—in particular, to focus more on ATTC as an important cognitive process in improving TEB. Furthermore, knowing the contextual influence on TEB might also influence educational practices more directly.

We would like to suggest a third future direction. This would be to investigate the influence of social relationships in TEB development. This may help us to a better understanding of collective efficiency beliefs, something that is currently lacking. At the present time, most of the identified themes seen as shaping TEB are individual and personal, relating to personal experiences, personal emotions and personal pedagogical beliefs. The relationship between TEB and the teacher's own social relationships is rarely studied. These relationships include the relationship with all key stakeholders—including colleagues, parents, and students. Although two of the reviewed studies, Bruce and Fynn (2012) and Chong and Kong (2012) found that TEB were developed through collaborative experiences, they touched only cursorily on social relationships, and they provided little insight. Could social interaction between teachers and these stakeholders affect the development of TEB?

What types of social interaction might be most helpful in the development of TEB. These questions are in urgent need of answers. If the social relationships are investigated in TEB development, this might shed light on the effects of social and verbal persuasion. This may make it easier to start shaping positive TEB through the influence of positive social interactions within the collective community in which teaching takes place.

Conclusion

In this review, we have identified six themes of TEB research in the LCP context. TEB is closely related to teachers' experiences, knowledge, emotions, beliefs about LCP, resources, and LCP implementation. TEB is shaped in a complex way by these six themes. Enactive and vicarious experiences, positive emotions, adequate resources, strong beliefs in LCP are more likely to shape positive TEB. It is not yet clear how TEB is related to teacher knowledge and LCP implementation. These relationship needs more investigation in future research. The trends in diversity in research methodologies, diversity in research contexts and specificity in domain has continued to deepen our understanding about TEB. Studies relating to sources of efficacy information (e.g., experiences and emotions) are receiving increasing attention in the LCP context. There are at least three areas which need further attention in future research. They are the influence of teacher knowledge, the effects of ATTC, and the social relationship in TEB development. We invite researchers and practitioners to join us in continuing to investigate these trends and emerging issues.

Appendix A

Data points from different reviewed studies for each theme

	Sources of data Authors (publication year)	TEB & experiences	TEB & emotion	TEB & resources	TEB & teacher knowledge	TEB & teacher beliefs	TEB & (intended) implemen tation
1	Alsawaie & Alghazo (2010)	*					
2	Annetta, Frazier, Folta, Holmes, Lamb, & Cheng (2013)	*					
3	Bruce & Flynn (2012)	*		*	*		
4	Bumen (2009)						*
5	Bursal (2012)	*			*		
6	Chong & Kong (2012)	*	*	*	*		
7	Cobaboglu & Capa-Aydin (2015)					*	
8	Cohen & Zach (2013)				*		
9	Dunn & Rakes (2011)					*	
10	Duran, Ballone-Duran, Haney & Beltyukova (2009)	*			*		
11	Ertmer, Schlosser, Clase, & Adedokun (2014)				*		
12	Flores (2015)	*					
13	Ford, Fifield, Madsen, & Qian (2013)						*
14	Gorozidis, & Papaioannou (2011)						*
15	Gürbüztürk, & Şad (2009)					*	
16	Gurvitch, & Metzler (2009)			*			
17	Horton & Martin (2013)	*					

Sources of data Authors (publication year)	Themes					
	TEB & experiences	TEB & emotion	TEB & resources	TEB & teacher knowledge	TEB & teacher beliefs	TEB & (intended) implementation
18 Leonard, Barnes-Johnson, Dantley, & Kimber (2011)	*			*		
19 Liang & Richardson (2009)	*		*			
20 Mansfield & Woods-McConney (2012)	*	*				
21 McCormick & Ayes (2009)				*		
22 Moseley, Huss, & Utley (2010)	*					
23 Nie, Tan, Liau, Lau, & Chua (2013)						
24 Nuangsaeng, Ketpichainarong, Ruenwongsa, Panijpan & Niemi (2011)	*	*	*			*
25 Richter, Kunter, Lüdtke, Klusmann, Anders, & Baumert (2013)			*			
26 Ruys, Van Keer, & Aelterman (2010)					*	
27 Ruys, Van Keer, & Aelterman, A. (2011)					*	
28 Sang, Valcke, van Braak, Zhu, Tondeur, & Yu (2012)	*					
29 Soprano & Yang (2013)			*	*		
30 Temiz, & Topcu (2013)						*
31 Teo (2009)						*
32 Thomson & Gregory (2013)			*			
33 Wyatt (2010)			*	*		
34 Wyatt (2015)				*		

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Table list

Table 1. *Quantitative description of the characteristics of reviewed papers*

Figure list

Figure 1. The cyclical nature of teacher efficacy beliefs. Note: Figure Adapted from "Teacher efficacy: Its meaning and measure," by Tschannen-Moran, Hoy, & Hoy, 1998, *Review of Educational Research*, 68(2), p. 228.

Appendix list

Appendix A Data points from different reviewed studies for each theme