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TEACHER EDUCATORS AS BELIEF NAVIGATORS: SHAPING PRE-SERVICE TEACHERS' PEDAGOGICAL BELIEFS

Zuraimi Zakaria^{1*}, Nor Tutiaini Ab. Wahid²

¹ Faculty of Education, Universiti Teknologi MARA (UiTM), Malaysia
Email: zurai125@uitm.edu.my

² Faculty of Education, Universiti Teknologi MARA (UiTM), Malaysia
Email: tutiaini@uitm.edu.my

* Corresponding Author

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Abstract:

This article is grounded in the perspective that pre-service teachers' pedagogical beliefs significantly impact their future classroom practice. It is argued that pre-service teachers have already formed a set of pedagogical beliefs by the time they enrol in teacher education programs. These beliefs are reported to be incongruent with the goals these programs strive to achieve. There is evidence that these pre-existing pedagogical beliefs often remain intact throughout the programs, and in some cases, are even reinforced by them. This is mainly because little effort is made by teacher educators to address or change these beliefs. Studies that investigated teacher change have also explored pedagogical beliefs, as changes in beliefs are a determining factor for changes in practice. The article proposes both general and specific measures that could be undertaken by teacher educators in the design of intervention strategies and programs aimed at changing the pedagogical conceptions and beliefs that pre-service teachers hold. Additionally, the article also addresses the origins and characteristics of these beliefs and their influence on classroom practice and teaching effectiveness.

Keywords:

Pre-Service Teacher, Pedagogical Beliefs, Teaching Practice, Teacher Educator, Teacher Change, Teacher Training Program

Introduction

Teachers' pedagogical beliefs, or beliefs about teaching and learning, are complex and multifaceted (Pajares, 1992; Sheridan, 2016; Wong & Luft, 2015), and each teacher may hold

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a different belief system, shaped by previous experiences and other complex constructs and elements (Roose, Vantieghem, Vanderlinde & Van Avermaet, 2019). It is well recognized in the literature the influence of teacher beliefs on emotions (Frenzel, Daniels & Buric, 2021; Shaifuddin & Ab. Wahid, 2022), and motivations (Kolin & Siew, 2022; Turner, Christensen & Meyer, 2009). A growing body of literature has also demonstrated the impacts of teacher beliefs on the way teachers approached their students and student learning (Chan, 2016; Charalambos, 2015; Fox et al., 2021; Ritter, Wehner, Lohaus & Kramer, 2019; Roose et al., 2019; Sabarwal, Abu-Jawdeh & Kapoor, 2022), their instructional decision-making process (Schelling & Rubenstein, 2021; Vanlommel, Van Gasse, Vanhoof & Petegem, 2017), and classroom actions (Bruckmaier, Krauss, Blum & Leiss, 2016; Charalambos, 2015; Meschede, Fiebranz, Moller & Steffensky, 2017; Roose et al., 2019; Zakaria, Care & Griffin, 2016).

Numerous studies (Berezki & Karpati, 2018; Debreli & Kucuk, 2016; Koross, 2016; Kagan, 1992; Pajares, 1992, 1993) highlighted that school experiences wielded more influence over teachers' classroom practices than their pre-service teacher training programs. Despite investing substantial time in learning about effective teaching during their pre-service training, many teachers initiated their teaching careers by emulating the methods employed by their school teachers. Consequently, conventional teaching approaches persisted characterized by teacher-centeredness (Kleickmann, Trobst, Jonen, Vehmeyer & Moller, 2016; Zakaria et al., 2016), didacticism (Sabarwal et al., 2022; Wong & Luft, 2015), and an authoritative role for teachers as knowledge transmitters (Kleickmann, 2016; Kogce, 2017; Wong & Luft, 2015). Moreover, studies have consistently reported that teacher training programs had limited impact on the teaching approaches adopted by beginning teachers (Meschede et al., 2017; Sabarwal et al., 2022). This demonstrated the enduring differences between pre-service teachers' beliefs regarding effective pedagogy and the instructional practices endorsed by teacher training programs (Berezki & Karpati, 2018; Fox et al., 2021; Sabarwal et al., 2022).

It has been suggested that teacher training programs re-examine their role in shifting pre-service teachers' core beliefs (Chan, 2016; Merisi & Pillay, 2020; Merk, Rosman, Rue, Syring & Schneider, 2018; Reynolds, Liu & McDonald, 2021). This recommendation was primarily driven by the consistent findings of various studies, indicating a significant connection between teachers' beliefs and their teaching practices (Qiu, Xie, Xiong & Zhou, 2021; Rott, 2020; Merisi & Pillay, 2016; Sheridan, 2016). Chan (2016), Charalambos (2015), Merisi and Pillay (2020), and Meschede et al., (2017) agreed that there has been limited evolution in the content and focus of teacher training programs in the past three decades. Meschede and colleagues (2017) noted that some of these programs did not aim to improve practice, but rather strived to prepare teachers who fit into the patterns of current practice.

It is neither assumed nor implied that teacher training programs have been ineffective in preparing future teachers for their teaching profession. However, central to this paper, supported by growing evidence of research findings (Chan, 2016; Merk et al., 2018; Merisi & Pillay, 2020; Ritter et al., 2019; Reynolds et al., 2021), is the premise that such programs do very little to address pre-service teachers' pedagogical beliefs. Studies measuring the effectiveness of teacher training programs in effecting change in pre-service teachers' pedagogical beliefs have reported no significant difference in their beliefs upon program completion (Kagan, 1992; Merk et al., 2018). It is worth noting that reported positive impacts of teacher training programs often based on the effectiveness of specific courses and interventions such as practicum and professional development programs (Eğinli & Solhi, 2021;

Mena, Peinado, and Hernandez, 2023; Qiu et al., 2021); while studies examining the effect of teacher training program as a whole have reported less than desirable outcomes (Chan, 2016; Merisi & Pillay, 2020; Reynolds et al., 2021).

For beliefs to change in congruence with the desired instructional practice, belief-focused interventions must be introduced within teacher training programs. Additionally, interventions by teacher educators should ensure that graduating teachers' actual practice in schools is shaped by their tertiary experience and accumulated on-the-job experience, not by their prior beliefs (Chan, 2016; Merisi & Pillay, 2020; Reynolds et al., 2021). To achieve this objective, this paper explores strategies that teacher educators can adopt in developing sustainable and effective teacher training programs aimed at addressing the pre-service teachers' pedagogical beliefs. General and specific measures are presented alongside the discussion of beliefs and the kinds of conceptions pre-service teachers have about teaching. These measures are drawn from research findings and literature related to the beliefs, attitudes, and conceptions of teachers and pre-service teachers toward teaching and learning.

Teacher Beliefs

Beliefs were described as 'propositions individuals consider to be true and which are often tacit, have a strong evaluative and affective component, provide a basis for action, and are resistant to change' (Borg, 2011, pp. 370–371). Kagan (1992) defined teacher beliefs as 'unconsciously held assumptions about students, classrooms, and the academic material to be taught' (p. 65). Beliefs about teaching were considered to be inclusive of teachers' attitudes, perceptions and expectations about what it takes to be an effective teacher (Wong, Chong, Lim & Choy, 2011). Defining pre-service teacher beliefs, Pajares (1993) viewed the beliefs as consisting of 'attitudes and values about teaching, students, and the education process that students bring to teacher education' (p. 2).

The significance of teacher beliefs in influencing teaching practices has been highly regarded by numerous scholars who have delved into these concepts. Beliefs act as filters through which teachers perceive the world, interpret information, and decide whether to accept or reject particular information (Li, 2012). Teachers' pedagogical beliefs encompass their perspectives on teaching and learning, including educational goals, roles, methods, and outcomes (Seifried, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Hermans, Tondeur, van Braak & Balcke, 2008). These beliefs are shaped by teachers' personal experiences, professional knowledge, and contextual factors, significantly influencing their instructional practices and decision-making (Hermans et al., 2008; Prestridge, 2012). Richardson (2003) asserted that teacher training programs solely focused on practices might not effectively bring about changes in teachers, a perspective that has persisted over time and continues to be upheld by various authors (Chan, 2016; Charalambos, 2015; Fox et al., 2021; Ritter et al., 2019; Roose et al., 2019; Sabarwal et al., 2022; Schelling & Rubenstein, 2021; Vanlommel et al., 2017).

Nonetheless, there is a growing body of evidence pointing to the varying impacts of teacher training programs as interventions on pre-service teachers' pedagogical beliefs. Savasci-Acikalin (2009) and Penn-Edwards (2010) observed that pre-service teachers were most susceptible to changes in their beliefs upon entering teacher training programs. Similar experiences were noted for in-service teachers transitioning into the teaching profession. As novice teachers, the connections between their beliefs and pedagogical principles were more

likely to be influenced by classroom experiences and the school environment. Over time, these connections tended to solidify, making changes in beliefs less likely (Savasci-Acikalin, 2009).

This phenomenon has been affirmed by Debreli and Kucuk (2016), Popova, Kraft, Harshman, and Stains (2021), and Sheridan (2016), who found that the initial years of teacher training programs had the most profound impact on addressing pre-service teachers' pedagogical beliefs. Debreli and Kucuk (2016), for instance, found that the first year of the training program was the most impactful in shaping the beliefs of ELT pre-service teachers. The authors reported that theories, modules and input received during the initial years of their training were salient in shaping the beliefs. Sheridan (2016), on the other hand, discovered the first two years of the four year-training program was critical in changing the pedagogical beliefs of pre-service teachers. Sheridan added that the initial years of the program were viewed as significant in laying the foundation on which pedagogy could be built.

It is well recognized in the literature that most teachers approached their teaching in a similar manner to that used by their school teachers (Bereczki & Karpati, 2018; Debreli & Kucuk, 2016; Kagan, 1992; Koross, 2016; Merisi & Pillay, 2016; Pajares, 1992, 1993). Meschede et al. (2017) cautioned that new information received during teacher training programs was not used to change mindset, but was typically assimilated into the existing belief framework. This resulted in unchanged practices and the consistent use of the same theories, pedagogical knowledge and research (Li & Li, 2019; Merisi & Pillay, 2020). Lack of exploration of pre-service teachers' pedagogical beliefs and teachers' resistance to change as suggested by Chan (2016), Merisi and Pillay (2020), and Reynolds et al. (2021) raised concerns about the actual impacts of teacher training programs.

Teachers' Pedagogical Beliefs

The beliefs that pre-service students have about teaching have been found to be inconsistent with the pedagogical knowledge and classroom behaviours expected by their teacher training programs. Merisi and Pillay (2020), for example, reported that their final year English ELT pre-service teachers believed that grammatical skills can be acquired informally and taught through communicative tasks and listening. These pedagogical beliefs contradicted the emphasis on explicit teaching that the graduates were exposed to throughout their four years of teacher training program. Similarly, the pre-service teachers in Kogce's (2017) study were found to hold views of teachers and students' roles that primarily fell between the absolute and transitional levels, which are the two lowest levels on Baxter Magolda's four-level epistemological reflection model. This suggested that pre-service teachers were transitioning from viewing these roles as factual and unquestionable to recognizing the influence of perspectives and contexts. Kogce emphasized the importance of pre-service teachers progressing to the contextual knowing stage, the final stage of the model, to demonstrate desirable beliefs that knowledge is context-dependent, enabling them to navigate and construct knowledge in various contexts.

In-service teachers had also been reported to demonstrate teaching behaviours incongruent with curriculum aspiration and initiatives. In Chan's (2016) study, for instance, kindergarten teachers retained their teaching practices despite acknowledging that they held beliefs similar to the advocated beliefs about teaching. Chan attributed these discrepancies to the teachers' professional education and their attitudes toward self-reflection in teaching, especially considering the pressure from parents and the responsibility of ensuring their students are

academically prepared for primary one. Li and Li (2019) revealed that the kindergarten teachers in their study demonstrated positive beliefs towards creative pedagogy however the reported practice was far from the emphasized implementation. In addition, Song (2015) noted a mismatch between the overwhelming support shown by primary school teachers towards the promoted child-centred pedagogy and their actual classroom implementation. The author associated the contradiction with teachers' superficial understanding of child-centred pedagogy.

On the beliefs about general effectiveness of teacher training programs, Qiu et al. (2021), detected significant belief changes in their experimental group with no significant changes reported for the control group. The authors carried out a longitudinal quasi-experimental study in measuring the effectiveness of practicum attachment. Qiu et al.'s findings demonstrated that teacher training program without designated intervention aiming at changing pre-service teacher beliefs may not assert any belief change. Additionally, Milton, Rohl and House (2017) found that only half of the pre-service literacy teachers in their study were convinced that the teacher training program attended had equipped them with sufficient skills in teaching spelling and grammar.

Teacher Resistance to Change

Beliefs and belief systems are complex, with one set of beliefs intricately connected and intertwined with networks of other beliefs (Biesta, Priestley & Robinson, 2015). Some beliefs hold greater significance and are more firmly entrenched than others, making them particularly resistant to change (French-Lee & Zellner, 2023). This complexity is evident in numerous research findings, which revealed that the belief sets of pre-service teachers often unaltered even after they completed their teacher training programs. For example, Merk et al. (2018) found that pre-service teachers' beliefs about their role as educators remained unchanged following their three-year training program. These teachers continued to prioritize their intuitions, personal preferences, and experiences over pedagogical knowledge. Similarly, Andersen (2020), Gelderblom, Schildkamp, Pieters, and Ehren (2016), Lasater, Bengston, and Abiladi (2021), and Vanlommel et al. (2021) reported that teachers in their studies predominantly based their instructional decisions on beliefs, intuitions, and personal judgments rather than on evidence and classroom data. Mandated reforms and bureaucracy were also factors hindering teacher change (Ab. Wahid & Talib, 2017; Gelderblom et al., 2016; Vanlommel et al., 2021; Mohd & Mohamad, 2022). These beliefs exhibited remarkable persistence and resistance to change throughout the teacher training program (Biesta et al., 2015; Lee & Kim, 2019; Li & Li, 2019).

There were also studies that reported positive findings. Zaruba, Westphal, Gutmann, and Vock, (2021) found that the pre-service teachers in their study developed both constructivist and transmissive views towards teaching and learning, and these aligned with positive implicit and explicit attitudes towards these approaches. Zaruba and her co-authors posited the possibility for the pre-service teachers in their study to develop contradicting views simultaneously, and they alternated between constructivist and transmissive thoughts and behaviours depending on their situations and context. Sheridan (2016) explained that providing meaningful educational opportunities in teacher training programs strategically would elicit positive pedagogical beliefs and desirable teaching practices. Quantitative data was gathered twice yearly, at the beginning and at the end of the year across the four-year teacher training degree program. Similar to other studies, Sheridan found that the pre-service teachers participated in the study

enrolled into the program with firm pre-conceived ideas of what constituted effective pedagogy and teaching, and these conceptions were intricately influenced by their 'personal qualities, beliefs and values' (Sheridan, 2016, p.636). She added that meaningful teaching opportunities manipulated on coursework and practical experience helped to reshape these initially held beliefs. Sheridan reported change in pedagogical beliefs over the duration of the program.

The importance of beliefs serving as the underlying core of teacher practice is well recognized in the literature (Bruckmaier et al., 2016; Chan, 2016; Charalambos, 2015; Fox et al., 2021; Meschede et al., 2017; Ritter et al., 2019; Roose et al., 2019; Sabarwal et al., 2022; Vanlommel et al., 2017; Zakaria et al., 2016). Consequently, successful reforms and initiatives came about due to the alignment of these initiatives with teachers' core beliefs. The influence of teacher beliefs was also observable in various contexts. For example, Bereczki and Kárpáti (2018) noted that the effective integration of creativity into education significantly relied on teachers' personal beliefs concerning creativity. Meanwhile, Taimalu and Luik (2019) highlighted the influence of teacher educators' beliefs and expertise on the integration of technology. They discovered that perceptions towards the value of technology had a substantial impact on how technology was incorporated into the teaching practices of teacher educators. In a study by Mena et al. (2023), it was revealed that pre-service teachers with practical experience displayed higher levels of motivation towards the teaching profession, as well as a greater commitment to elementary education students in comparison to their counterparts who never taught before. The authors further noted that individuals who initially selected teaching as their primary career choice found the guidance and support provided by school teachers and faculty advisors to be particularly meaningful.

Reported changes in pre-service teachers' beliefs were often the consequence of a particular intervention designed specially to exert change in the students which, in most cases, fed the program designers with the information about program effectiveness. Examples of interventions are professional development for teachers, new teaching approaches or technique trial on student groups, and studies involving pre-service teachers in looking at the effectiveness of a particular course or program. In normal running of teacher education programs, such interventions were uncommon (Savasci-Acikalin, 2009).

Changing Pre-service Teachers' Pedagogical Beliefs

Teachers' pedagogical beliefs are central to classroom practice, and any efforts to get teachers to change their teaching practices should first attempt to change the beliefs (Bruckmaier et al., 2016; Meschede et al., 2017; Roose et al., 2019; Schelling & Rubenstein, 2021; Vanlommel et al., 2017). There has been a significant amount of research and literature to explain the role of teacher training programs in positioning and carrying out their curriculum in such a way that pre-service teachers' beliefs are addressed (Debreli & Kucuk, 2016; Eginli & Solhi, 2021; Kleickmann et al., 2015; Koross, 2016; Qiu et al., 2021; Reynolds et al., 2021; Sheridan, 2016; Zaruba et al., 2021). However, little evidence could be found in the literature that pointed towards teacher training programs considering specific tasks and strategies to intervene the beliefs of pre-service teachers (Chan, 2016; Merisi & Pillay, 2020; Qiu et al., 2021). Hence the remaining focus of this paper highlights those roles.

Rethinking the Role

The literature review conducted has revealed several issues concerning teacher education

programs in relation to pre-service teachers' pedagogical beliefs and their impacts on shaping their teaching practices.

- i. The pre-service teachers' pedagogical beliefs are well established by the time they begin their teacher training program (Bereczki & Karpati, 2018; Debreli & Kucuk, 2016; Kagan, 1992; Koross, 2016; Merisi & Pillay, 2016; Pajares, 1992, 1993; Sheridan, 2016).
- ii. These pedagogical beliefs influence the way pre-service teachers learn (Penn-Edwards, 2010) and the way they will teach others (Chan, 2016; Fox et al., 2021; Roose et al., 2019; Sabarwal et al., 2022).
- iii. The pre-service teachers leave their teacher training programs with the same beliefs they have prior to joining such programs (Kagan, 1992; Merk et al., 2018; Merisi & Pillay, 2020; Song, 2015).

The pre-service teachers were found to complete their teacher training programs with their pre-existing pedagogical beliefs still intact. This indicated that their school experience had more profound impact in determining their teaching practice than the pedagogical practice promoted during training. Therefore, there is a need for teacher training programs to examine how their programs impact on shaping pre-service teachers' actual practice once they graduate and commence with their teaching profession. This involves looking beyond the effect of such education on student knowledge, but determining the extent of teacher education experience in shaping teachers' instructional practice (Fox et al., 2021; French-Lee & Zellner, 2023; Qiu et al., 2021; Roose et al., 2019; Rott, 2020).

One of the best predictors of teaching practice is the core pedagogical beliefs, hence it is imperative that these beliefs are addressed and intervened at higher education level (Chan, 2016; Merisi & Pillay, 2020; Merk et al., 2018; Sheridan, 2016). Chan (2016), Pajares (1993), and Sheridan (2016) stressed that changing beliefs is likely if the effort is continuous, hence called for teacher educators to provide programs that integrate focus for changing beliefs throughout students' higher education experience. The authors cautioned that in order to do this, teacher training programs need to have clear shared visions and theoretical rationales.

Chan (2016), Mena et al. (2023), and Sheridan (2016) emphasized the importance of teacher training programs refocusing their goals to support pre-service teachers in becoming not just teachers in terms of fulfilling their functional duties, but holistic educators. Therefore, in addition to offering experiential and meaningful learning opportunities (Sheridan, 2016; Timperley, Kaser, and Halbert, 2014), it is critical to scrutinize the pedagogical processes employed within these teacher training programs (French-Lee & Zellner., 2023; Mena et al., 2023; Qiu et al., 2021). These processes may encompass various forms of reflective writing, including logs, diaries, journals, and reports, as well as metaphor development and analysis (Vanassche & Kelchtermans, 2015), critical incident recording and analysis, life history, autobiography, and action research (Emerald & Carpenter, 2016; Rinehart & Earl, 2016). The use of these methodologies brings to the forefront significant awareness regarding personal beliefs and conceptions of learning and teaching, underlying assumptions, and their implications for teaching quality and the prospective students' learning quality (Benade, 2015; Earl and Ussher, 2016). This necessitates a re-evaluation of teacher educators' approaches and the materials employed during their interactions with pre-service teachers. Teacher educators should encourage students to articulate their personal theories explicitly, guide them in

analysing these theories to identify their sources, and examine them in relation to their implications for professional practice (Pajares, 1993; Qiu et al., 2021; Sheridan, 2016).

In addition, teacher educators must recognize the affective impacts they have on students and their role, knowingly or unknowingly, in shaping the pre-service teachers' beliefs and attitudes toward a particular issue, subject, or course (Chan, 2016; Lee & Kim, 2019; Mena et al., 2023). Grootenboer (2006) posited that teacher educators are fully aware of the cognitive responsibility that they have toward pre-service teachers. However, in the course of teaching the necessary skills and knowledge, they might have inadvertently conveyed negative beliefs and attitudes to their students. Recognizing the significant influence they wield over students' emotions can help educators instil appropriate beliefs in students, contribute to the success of emotional reform initiatives, and conscientiously fulfil their emotional roles in a more ethical manner (Merisi & Pillay, 2020; Sheridan, 2016).

Encouraging Pedagogical Strategies that Lead to Desirable Outcomes

Various studies have highlighted that teachers are more likely to change their beliefs after their innovative attempt at trying out new strategies or approaches bears successful results (Chen, 2015; Chung, 2022; Hunt, Duarte, Miller, Bentley, Albrecht & Kruse, 2023; Pajares, 1993; Reynolds, 2021). These successful 'results' could be in the forms of improved student learning, student engagement and learning outcomes (Kogce, 2017; Lee & Kim, 2019; Treacy & Leavy, 2023); or simply the improvement in teaching (Charalambos, 2015; Chen, 2015; Chung, 2022). This proves a reverse relationship between change in beliefs and change in practice and the possibility for teachers to alter their beliefs and belief systems after the modification in their practice (Chen, 2015; Chung, 2022; Hunt et al., 2023). Thus, the key to change is by making small steps to change classroom practice. Guskey (2002), however, reminded that if trying out new classroom practice does not yield much success or does not work the way it was intended to, teachers would revert back to their typical mode of teaching; in doing so, further strengthening their initial beliefs.

Teacher change is also more significant if it is intrinsically-driven. Bonner (2006) suggested that teachers change at individual level, and even though authorities and governing bodies can mandate changes in teaching through reforms, requirement alone will not facilitate for teacher change. Studies that delved into change in practice due to mandated requirements and accountability purpose have highlighted teachers' superficial engagement and limited implementation (Gelderblom et al., 2016; Sun, Przbylski & Johnson, 2016; Young, McNamara, Brown & O'Hara, 2018). Mena et al. (2023), Sabarwal et al. (2022), Treacy and Leavy (2023), and Sheridan (2016) stressed that for successful attempts at change to be more significant, the teachers themselves should initiate in making changes, for once success is the result of such trial, it is more likely for the change in beliefs to have a long-term effect.

Creating Cognitive Conflicts

Unlike students in other academic programs, pre-service teachers transition from their schooling experience to teacher training programs and eventually to their teaching careers within familiar environments. This continuity in surroundings often does not challenge pre-service teachers to reconsider their circumstances or adapt significantly (Pajares, 1993). Consequently, they tend to integrate new information into their existing frameworks without the need for substantial adjustments to their pre-existing beliefs (Kagan, 1992; Merk et al., 2018; Merisi & Pillay, 2020; Song, 2015). Pajares (1993) cautioned that this lack of disruption

to their accustomed settings is one of the primary reasons pre-service teachers tend to retain their initial pedagogical beliefs.

Therefore, it has been proposed that an effective method for challenging teachers' pedagogical beliefs is to induce cognitive conflict that contradicts their existing belief systems (Pajares, 1993; Guerra & Wubbena, 2017; McFaddin, 2018; Treacy & Leavy, 2023). Cognitive dissonance theory leverages the clash between prior experiences and new cognitions as a mechanism for altering beliefs (Festinger, 1957). The ongoing discourse on teacher transformation frequently revolves around the concurrent feelings of discomfort and upheaval that teachers confront when attempting to modify their entrenched practices (Guerra & Wubbena, 2017; Treacy & Leavy, 2023). Nonetheless, this state of 'cognitive dissonance,' as articulated by Festinger in 1957, is an inherent aspect of the teacher change process (McFaddin, 2018; Treacy & Leavy, 2023).

Cognitive dissonance, as suggested by Pajares (1993), serves as a catalyst for prompting an inquiry into one's beliefs. Pajares further highlighted the significance of teacher educators observing how their students filter new information. To align with this perspective, educators are encouraged to design activities that deliberately challenge student beliefs. Such instructional strategies should aim to identify student beliefs and assess the accommodation or rejection of new information within these beliefs (Bradbury, 2022; Treacy & Leavy, 2023).

Reflecting on Beliefs and Practice

There is a growing body of literature that reports on the strength of reflective practice in getting teachers to critically examine their instructions and changing them for improvement (Choy, Yin & Tan, 2017; Mathew, Mathew & Peechattu, 2017; Vaughn, Parsons, Keyes, Puzio & Allen, 2017; Zakaria, 2020). In fact, reflective practice is one of the most widely discussed topics of teacher learning (Borko, 2004). Teachers were reported to improve their understanding of the courses they taught (Aldahmash, Alshmrani & Almufti, 2017; Gaciu, Dalzell, Davis, Diamond & Howard, 2017), improve their understanding of student learning, examine the strategies and approaches they used with the consequence effect of modifying their practice (Benade, 2015; Gaciu et al., 2017; Zakaria, 2020), and in some studies, having a refreshed perspective of their own instructional practice and teaching career (Mathew, et al., 2017; Moradkhani, Raygan & Moein, 2017; Vaughn, et al., 2017).

Pajares (1993) posited that individuals will not change the beliefs that they have no idea of holding, and will only change the beliefs that they are aware of if they see good reason for doing so. Taking Pajares' view, it is important for teacher educators to first bring to the surface pre-service teachers' pedagogical beliefs, and to understand how these beliefs directly influence their learning practices (Eart & Ussher, 2016; Gaciu et al., 2017), their conceptions of teaching (Benade, 2015; Vaughn et al., 2017), and its influence on their professional practice (Mathew, et al., 2017; Moradkhani, et al., 2017).

Teacher reflection promotes positive belief inquiry (Benade, 2015; Earl & Ussher, 2016; Zakaria, 2020). In fact, whatever strategies teacher educators bring into the classrooms are futile if the pre-service students fail to reflect on its usefulness (Earl & Ussher, 2016). It has been suggested that teacher educators employ the use of logs, diaries, journals and reports, metaphor development and analysis, critical incident recording, self-study and analysis (Vanassche & Kelchtermans, 2015), life history and autobiography (Mayer, 2006), narratives

in support and refutation of educational issues (Earl & Ussher, 2016), studies that can be used to place emphasis on critical examination of beliefs such as mini ethnographic or autoethnography studies (Emerald & Carpenter, 2016, Rinehart & Earl, 2016) action research and case studies (Earl & Ussher, 2016).

Several reflective techniques have been used to challenge pre-service teachers' beliefs. Howitt (2008) employed facilitated reflection to encourage the pre-service teachers to critically analyse their beliefs, values and practices of teaching and learning science. In facilitated reflection, the students were presented with the opportunity to reflect, built expectations with regard to the quality of reflection and scaffolded to support the development of reflection as a skill (Howitt, 2008). Timperley et al. (2014) proposed a framework that assists the process of teacher reflection using spiral of inquiry. The authors posited that promoting curiosity, focusing on the learner, providing opportunities for learner agency, opening up thinking, and enabling honest dialogue with colleagues are all necessary for inquiry to progress constructively. The framework encompasses a process that encourages the presentation of intuitions and feelings about what is genuinely transpiring for learners in an organized and routine manner. The authors described that the framework enables teachers to be metacognitively aware of their own learning and are therefore consciously able to monitor their own learning experience (Timperley et al., 2014).

Preservice Teachers' Pedagogical Belief Transformation: Challenges and Successes

Numerous studies have illustrated the enduring nature of pre-service teachers' pedagogical beliefs (Bereczki & Karpati, 2018; Debreli & Kucuk, 2016; Kagan, 1992; Koross, 2016; Merisi & Pillay, 2016; Pajares, 1992, 1993; Sheridan, 2016). However, prolonged neglect of these beliefs may result in the perpetuation of unchanged teaching practices over time, as teachers tend to emulate the instructional practice that they themselves received during their schooling experience (Merk et al., 2018; Merisi & Pillay, 2020; Song, 2015). The individual belief systems held by teachers are multifaceted, encompassing beliefs about their profession, students, subject matter, and their roles and responsibilities (Biesta et al., 2015; Kagan, 1992; Pajares, 1992, 1993). Some of these beliefs become deeply entrenched within the network of their overall belief system (French-Lee & Zellner, 2023). It has been well-established that altering pre-service teachers' beliefs is a slow and challenging process (Lee & Kim, 2019; Li & Li, 2019). In fact, attempts to address these beliefs have shown to yield counterproductive outcomes if not executed successfully (Richardson, 2003). Rather than embracing the desired pedagogical methods and classroom practices advocated during interventions, pre-service teachers may become even more resolute in their existing convictions, further reinforcing their belief in the validity of their prior beliefs (Guskey, 2002; Richardson, 2003).

Despite the persistence of pre-service teachers' pedagogical beliefs, there is a growing body of evidence that highlights their vulnerability and susceptibility to change, particularly in the initial years of their teacher training programs (Debreli & Kucuk, 2016; Popova et al., 2021; Sheridan, 2016). This recognition of the potential for change highlights the importance of addressing these beliefs early in the professional development of educators. However, it is essential to acknowledge that considering teacher training programs as belief interventions in themselves is insufficient. To bring about meaningful shifts in pre-service teachers' pedagogical beliefs, interventions must be systematically structured and highly targeted, integrated consistently throughout the entire duration of teacher training programs (Chan, 2016; Merisi & Pillay, 2020; Merk et al., 2018; Reynolds et al., 2021).

In this context, teacher educators emerge as key agents of change. Their role extends beyond traditional instruction; they hold the responsibility of developing and implementing specific interventions aimed at positively influencing pre-service teachers' pedagogical beliefs (Chan, 2016; Merisi & Pillay, 2020; Reynolds et al., 2021; Taimalu & Luik, 2019). To achieve this goal effectively, teacher educators can employ a range of proven measures. These include the introduction of pedagogical strategies that lead to tangible success (Chen, 2015; Chung, 2022; Hunt et al., 2023; Pajares, 1993; Reynolds, 2021), the creation of cognitive conflicts that challenge existing beliefs (Guerra & Wubbena, 2017; McFaddin, 2018; Treacy & Leavy, 2023), and a strong emphasis on reflective practice (Choy, Yin & Tan, 2017; Mathew et al., 2017; Vaughn et al., 2017; Zakaria, 2020).

These strategies should not be isolated incidents or sporadic interventions. Instead, they should be thoughtfully integrated into the broader teacher training curriculum, ensuring a continuous and intentional focus on belief transformation. This comprehensive approach acknowledges the intricate interplay between pedagogical beliefs and teaching practices and strives for a more robust and lasting impact on the future educators' professional development.

Conclusion

This paper is based on the premise that pre-service teachers' pedagogical beliefs exert a significant influence on their future classroom practices. A review of the literature concerning these beliefs has highlighted four critical points: First, pre-service teachers often enter teacher training programs with firmly established pedagogical beliefs. Second, these beliefs serve as the foundational lens through which these future educators approach their teaching practices, students, and their profession. Third, it is observed that novice teachers frequently leave their teacher training programs with the same beliefs they held before enrolling, primarily because these programs tend to prioritize teaching methodologies rather than addressing belief transformation. As such, changing the pedagogical beliefs of pre-service teachers should be a top priority for teacher educators, as it plays a pivotal role in enhancing the quality of educators and, consequently, the overall impact of teacher education programs. The paper presents both general and specific measures, offering valuable insights for teacher educators on how to effectively address and reshape the pedagogical beliefs and conceptions of pre-service students regarding teaching. While ethical considerations and precautions must be taken into account, the significance of addressing these beliefs should not be underestimated.

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