Typologies of Didactical Strategies and Teachers' Pedagogical Beliefs: A Theoretical Review

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ABSTRACT
Didactical strategies are one of the most influential vehicles that directly contribute to transforming knowledge. Varying types of didactical approaches are being adopted and implemented in the preparation of future teachers in the initial teacher education set up. The current conceptual paper is based on rigorous literature review on the typologies of didactical strategies adopted in the initial teacher education. The purpose of this conceptual and theoretical study is to evaluate and contrast varying didactical approaches while navigating through literature. The study also aims at exploring the interrelationship of didactical approaches with teacher cognitions i.e., teacher pedagogical beliefs. The methodology of this study based on the selection of six types of didactical strategies by Van De Grift (2007) and to compare and contrast them with other typologies available in literature and to explore the interrelationship with teachers' pedagogical beliefs. The study concludes that the varying typologies of didactical strategies are being adopted and implemented in the ITE set up and these strategies have strong relationship with teacher's pedagogical beliefs. The study recommends that the teachers' cognitions i.e., teachers' pedagogical beliefs may be included in the curriculum when preparing future teachers in the initial teacher education setting. These findings are substantial for policy makers, curriculum developers, head teachers, and other stakeholders in the initial teacher education.

Keywords: didactical strategies, teacher cognitions, pedagogical beliefs, initial teacher education

INTRODUCTION

Didactical strategies are defined as concrete teaching approaches, consciously selected and implemented teacher actions in view of attaining learning objectives in students (see, e.g., Jones & Tanner, 2002; Valcke et al., 2010). The

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Contribution of this paper to the literature

- The current paper deals with the didactical strategies adopted in the initial teacher education settings. The current paper enriches the existing literature while providing a contrast and alignment of variety of didactical strategies adopted in the initial teacher education.
- The current paper is unique for its contribution to the existing literature in terms of interrelationship of didactical strategies and pedagogical beliefs. Hardly studies are found that establish this kind of relationship. Teacher cognitions are significant in the selection of didactical strategies.
- The typologies of didactical strategies presented in this paper are of varying types that give a clear picture to understand the teaching styles of teacher educators for the preparation of future teachers in the initial teacher education settings.

latter goes back to the different clusters of competences referred to by Zhu and Wang (2014) that require teachers to adopt a wide variety of strategies to be able to choose adequate behaviour to invoke learning, educational, technological and social competences or – when building on the TPACK model – to invoke technological and pedagogical content knowledge. Each cluster helps attaining the learning objectives in different ways. It is, therefore, obvious that teachers adopt and implement very different didactical strategies in the classroom in view of the attainment of specific learning objectives (Darling-Hammond, 2006).

Differences in didactical strategies can be identified in different ways. Chickering and Gamson (1989) base their distinction on seven principles that define didactical strategies. These principles refer gain to the critical need to guarantee that these strategies help attaining the learning objectives:

1. Encourage contact between student and faculty
2. Develop reciprocity and cooperation among students
3. Encourage active learning
4. Give prompt feedback
5. Emphasise time on task
6. Communicate high expectations
7. Respect diverse talents and ways of learning

Another way of specifying didactical strategies is by looking from a historical perspective. In this way, we observe a shift from teacher-oriented (also labelled as theory-oriented and rote learning) to student-centred didactical strategies (Darling-Hammond, 1996; Hermans, Tondeur, van Braak & Valcke, 2008).

Student-centred didactical strategies are often labelled as 'constructivist' and teacher-centred are labelled as 'traditional' teaching strategies. Describing the student-centred approach, Mayer (2010) explains this requires teachers invoking an active learning process in which learners are active sense-makers and seek to build coherent and organised knowledge. Cannon and Newble (2000, pp. 16-17) define student-centred didactical approaches as "ways of thinking about teaching and learning that emphasise student responsibility and activity in learning rather than content or what the teachers are doing". In the literature, student-centred didactical approaches are also labelled in different ways; i.e., student-activating didactical methods (Struyven, Dochy, Janssens, & Gielen, 2006), problem-based-learning (Dochy, Segers, Van den Bossche, & Gijbels, 2003), powerful learning (De Corte, 2000), discovery learning (Mayer, 2004) and collaborative/cooperative learning (Slavin, 1995).

In contrast to student-centred didactical approaches, teacher-centred didactical strategies mainly focus on lecturing methods, disciplined teaching methodology and strict teacher-based classroom decisions regarding teaching and learning (Orlich, Harder, Callahan, Trevisan, & Brown, 2009). Following traditional didactical strategies, teacher impart information and knowledge to the students who remain passive (Prince, 2004).

In the next paragraphs, we explain the teachers' cognitions and we base on Korthagen's (2005) onion model that reflects teachers' behaviour and beliefs.
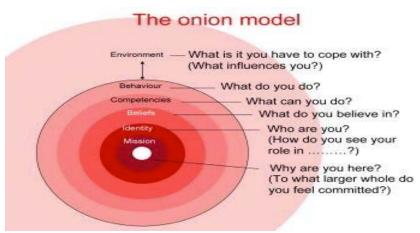
Figure 1. The onion model adapted from Korthagen (2005)

TEACHERS' COGNITIONS

Empirical research indicates that the adoption and implementation of didactical strategies is influenced by a variety of factors; such as teacher training, teacher beliefs, teacher's personal identity, and teacher's self-actualization (Struyven et al., 2010; Suleman, Aslam, Habib, Gillani, & Hussain, 2011). The latter factors refer to teacher cognitions, discussed in the next paragraphs.

Generally, teacher cognitions are described as the set of beliefs, self-perception and opinions of teachers about teaching. Defining teacher cognitions, Borg (1999) conclude that actually teacher cognitions are stores of beliefs, knowledge, theories, assumptions and attitudes that play a significant role in shaping teachers' instructional decisions. Burns (1992) is of the opinion that teacher cognitions are beliefs that foster the adoption of didactical strategies and smooth the teaching process. Authors also link teacher cognitions to various individuals' personal attributes such as personal pedagogical systems, theories, conceptions, theoretical beliefs, images and cultural attributes (Fishbein & Ajzen, 1975; Hermans, Tondeur, van Braak, & Valcke, 2008; Korthagen & Vasalos, 2005; Macalister, 2012; Nespor, 1987; Pajares, 1992; Sang, Valcke, van Braak, & Tondeur, 2009).

Teacher cognitions are influential elements that affect teacher behaviour in view of the effective adoption of didactical strategies (Zembylas, 2005). On the other side, teacher behaviour also significantly uplifts teacher cognitions, suggesting a mutual interrelationship between teacher cognitions and behaviour (Clarke & Hollingsworth, 2002). This is central to the onion model of a teacher's identity of Korthagen and Vasalos (2005).

According to the onion model, a teachers' identity is based on five layers, i.e., behaviour, competency, belief, mission, and identity. Behaviour and competences are the outer layers. Belief, mission and identity are the inner parts of the model that provide the base for a teacher's behaviour (Korthagen & Vasalos, 2005). All layers are interlinked with one another. This is, in particular, clear when it comes to the relationship between teacher cognitions (beliefs layer), teacher competences, and teacher behaviour.

Studies, set up in an initial teacher education context, reveal a positive connection between teacher beliefs and the adoption of didactical strategies and despite this relationship with the adoption of didactical strategies, they are hardly given due consideration in the preparation of future teachers (Valcke et al., 2010).

In the present paper, we based on beliefs (one of the onion model layers), and build on the following list of teacher cognitions in relation to the didactical strategies:

Pedagogical beliefs - teaching beliefs

The rationale for focusing on this list, is related to the available theoretical and empirical evidence, linking these cognitions to the adoption of didactical strategies by (student) teachers (Goldberg & Cornell, 1997; Kramarski & Michalsky, 2009).

METHODOLOGY

In view of the present study design, we build on an eclectic integration of types of didactical strategies. By comparing a number of key authors, we developed the following table in which we compare a typology presented by Van de Grift (2007) with typologies/distinctions presented by other authors.

Table 1. Comparison of different typologies for didactical strategies

Authors	Type1	Type 2	Type 3	Type 4	Type 5	Type 6
Van de Grift (2007)	Strategies that foster the learning strategies by learners	Matching student characteristics with teaching	Students' active engagement in the classroom	Effective teacher instruction strategies	Organising the teaching activities	Positive classroom climate
Horn et al., (2005)	Strategies to address complex learning problems		Developing students self-confidence for active participation	Developing connection between teaching and real life		Positive student-teacher relationship strategies
Perrott (2014)	Simplifying the complex problems	Student previous knowledge matching strategies			Orderly management of lessons	
Trees (2013)	Cooperative strategies by learners	Cater the needs of diverse students	Student group dynamics	Illustration of difficult content	Student formative assessment strategies	Comfortable class environment optimise learning
Westwood (2008)		Managing individual differences in learning	Interactive instructional methods	Developing liaison between student and teaching		Democratic class environment

From the table, it is clear most typologies/distinctions are interrelated. Most types reappear in the different classifications. In the column 'not aligned", we perceive especially very specific strategies that in fact could be translated into the more general other categories.

Secondly, it has to be stressed that distinguishing these didactical strategies does not imply that they are not related. The teaching process is a holistic endeavour in which didactical strategies are interlinked (Van de Grift, 2007). In the present paper, we build on the typology of van de Grift (2007), when discussing the different didactical strategies. In the next section, we discuss the different (aligned) types of didactical strategies and its relationship with teachers' pedagogical beliefs.

DISCUSSION

In the following paragraphs, we elaborate each didactical strategy of Van De Grift (2007) very precisely with the other key authors we found in the existing literature. We also develop a link between each type of didactical strategy with teachers' cognitions based on the existing literature.

Strategies that Foster the Adoption of Learning Strategies by Learners

Following this type of didactical strategies, (student) teachers adopt and implement strategies that enables the learners to understand the complex learning problems (Horng et al., 2005). The teacher introduces exercises removing difficulties in lesson content and help students to comprehend the knowledge (Westwood, 2008). Simplifying complex problems also helps students with lower level learning capabilities (Perrott, 2014). This type of strategies pushes students to check their solutions (Van de Grift, 2007).

Strategies to Match the Teaching and Learning Activities to Student Characteristics

Here, the focus is on individualising didactical strategies in the classroom. Since the classroom is a diverse place of learning, every student possesses a unique person. It is not wise to teach all the students through a single didactical approach (Westwood, 2008). To cater the needs of diverse students, didactical strategies have to address the nature of individual differences (Orlich, Harder, Callahan, Trevisan, & Brown, 2009; Trees, 2013). A competent teacher will apply strategies to analyse the abilities of each student in the class and arrange the lesson as per the individual requirements. This will require probing students' previous knowledge (Perrott, 2014).

Strategies to Make Students Actively Engaged in the Classroom

Following this type, didactical strategies activate students in the classroom. Teachers need therefore select, prepare and deliver challenging teaching materials (Orlich et al., 2009). The teacher can engage students in think-pair-share kind of activities, brainstorm activities and other ways to push innovative ideas (Chickering & Gamson, 1999). Especially choosing interactive strategies is helpful to make student actively engaged in the classroom (Van de Grift, 2007). This boosts students' self-confidence (Horng et al., 2005) and students' vigilance (Trees, 2013). Student-centred didactical strategies are more apt to keep students actively engaged in the classroom (Westwood, 2008).

Strategies that Centre on Effective Teacher Instruction

These didactical strategies invoke clear explanations of the learning content during instruction (Killen, 2012; van de Grift, 2007). The teacher helps and monitors students' learning activity while developing a liaison between teaching and student interest and his/her ability (Westwood, 2008). Students are encouraged to raise questions (Trees, 2013). The strategies also try to establish a connection between the teaching content and real life (Horng et al., 2005). And most of all, the teacher provides feedback to students and monitors whether lesson objectives have been achieved.

Strategies that Help to Organise the Teaching Activities

These strategies require teachers to consider the sequencing and order within and between activities. Orderly conducted lessons are critical (Van de Grift, 2007). This is often referred to as classroom management strategies and is considered as a type of very effective didactical strategies (Chickering & Gamson, 1999). It is also linked to a strict planning of (summative and formative) evaluation, (Perrott, 2014; Trees, 2013). It additionally requires strict of time management (Orlich et al., 2009).

Strategies to Develop the Positive Classroom Climate

Following this type of strategies, teachers focus on a positive and healthy teacher-student and supportive student-teacher relationship (Wubbels & Brekelmans, 2005; Wubbels, Levy, & Brekelmans, 1997). To optimise

learning, students are allowed to speak freely, share ideas, and take initiatives. This helps them feeling comfortable (Trees, 2013). Such a congenial and friendly learning environment plays a significant role in the mental boost up in students (Killen, 2012). It is also, labelled as developing a democratic environment ensuring the development of self-confidence of learners (Westwood, 2008).

Further, we base our paper on the three layers (behaviour, competencies and beliefs) of the onion model – discussed below - when talking about teacher's professional identity. The adoption and implementation of didactical strategies represents behaviour and competencies and is linked to specific teacher cognitions (i.e., pedagogical beliefs). We stress in this context the relationship between the adoption of didactical strategies and these teacher cognitions.

In the following paragraphs, we discuss this list of teacher cognitions (pedagogical beliefs) and how they can be related to the adoption of didactical strategies.

The Interrelationship between (Student) Teachers' Pedagogical/Teaching Beliefs and the Adoption of Didactical Strategies

Teachers' teaching/pedagogical beliefs are a source of a successful teaching–learning process and helps teachers dealing with ill-structured educational classroom conditions (Nespor, 1987). Van Driel, Bulte, and Verloop, (2007) clustered beliefs following their affective, evaluative, and episodic nature. But, a predominant typology of pedagogical-teaching beliefs in the literature builds on the distinction between traditional and constructivist pedagogical-teaching beliefs. Traditional pedagogical-teaching beliefs refer to didactical strategies focusing on teacher-centred teaching approaches where learners are supposed to follow strict teacher guidelines. On the other hand, constructivist pedagogical-teaching beliefs provide autonomy to the students and are therefore often called student-centred beliefs (Woolley, Benjamin, & Woolley, 2004).

Authors state that (student) teachers' pedagogical-teaching beliefs are persistent and therefore hard to change (Kagan, 1992; Korthagen, 2004; Pajares, 1992). This explains why – even after attending initial teacher education or professional development, (student) teachers continue adopting didactical strategies less favourable for the specific teaching-learning setting. Authors found that (student) teachers' pedagogical-teaching beliefs play a significant role in the acquisition and transmission of knowledge in classrooms (Borg & Al-Busaidi, 2011; Murphy, Delli, & Edwards, 2004; Norton, Richardson, Hartley, Newstead, & Mayes, 2005). Waters-Adams (2006) reinforced the association between teaching beliefs and classroom strategies, and stated "beliefs were found to be the determining factor in the teachers' decisions about classroom strategies" (p. 919).

Below we explain the interrelationship of pedagogical beliefs with the typology of didactical strategies introduced above.

Strategies that foster the adoption of learning strategies by learners

This type of strategies help learners to adopt specific learning strategies, i.e., solving the complex learning problems, overcoming difficulties in lesson content, and helping in comprehending the knowledge. Less literature is available as to the interrelationship of teaching beliefs with these specific types of didactical strategies. Nevertheless, Raymond (1997) could positively link the teaching beliefs with adequate selection of challenging lesson content (mathematics). Webster (2015) identified a clear link between teacher beliefs and the extent to which students were supported in developing regulation skills. He identified teacher beliefs that attributed inattentiveness and impulsivity to biological unchangeable factors, less likely to foster regulation. In contrast, teachers who stressed a student centred approach – as reflected in their attention paid to the classroom environment, their instructional style, and the fact they wanted to motivate learners - would pursue the development of these regulation strategies. Lastly, Burton and Frazier (2012) found how the adoption of strategies that foster inquiry learning strategies, seems to be strongly aligned with teacher beliefs and their perceptions about the need for teaching inquiry in their classrooms. This reiterates the findings of Ong, Hart and Chen (2016) who – on the base of observations, interviews and surveys – concluded that teachers who focus on deep level thinking,

foster questioning by students, engage in discussion with students, reflect particular beliefs about the nature of the learning process and the way pupils function in their classrooms. They state (ibid, p.12): "These beliefs and values to improve student's thinking appear to be significant influences in guiding the way he used questions and follow-up moves in class".

Strategies to match the teaching and learning activities to student characteristics

Teaching the diverse students always need careful planning and the adoption of appropriate didactical strategies while considering individual differences and student characteristics. Paying attention to student characteristics reflect a dominantly student-oriented approach. This could already be confirmed in an early study of Stanovich and Jordan (1998). Other authors focused on the extent to which teacher beliefs play a role when teaching low-achieving students and select didactical approaches that invoke higher level thinking. They conclude: "teachers' beliefs in this context are related to their general theory of instruction: viewing learning as hierarchical in terms of students' academic level was found to be related to a traditional view of learning, i.e., seeing learning as progressing from simple, lower order cognitive skills to more complex ones" (Zohar, Degani, & Vaaknin, 2001, p. 469). Ho and Liu (2015) identified two beliefs approaches: instructional and managerial. The latter led to a lesser extent of being able to cope with learner difficulties and disabilities. Also, Leyser (2002) found how teachers' beliefs did affect their capacity to cope with special education needs in both normal and special education learners. Again, student-centred beliefs were a defining factor in teachers.

Strategies to make students actively engaged in the classroom

This type of strategies focuses on activating students' engagement in the class, boosting students' self-confidence and applying specific didactical strategies. Authors show how teachers' self-reported beliefs directly influenced student academic engagement through their choices for specific didactical behaviour (Archambault, Janosz & Chouinard, 2012). Other authors explicitly state how a shift is needed from teacher-centred to student-centred beliefs in view of developing stronger engagement of students in the classroom (Larrivee, 1997). But, some others (see, e.g., van Uden, Ritzen, & Pieters, 2014) stress the interrelationship between teaching beliefs and student engagement in the classroom is complex. These authors state: "it is difficult to predict the extent to which teachers are able to foster student engagement, based on their beliefs" (ibid, p. 30). In a parallel study (ibid, 2013) they concluded that the linkage between teacher beliefs and learners' emotional engagement was stronger than the linkage between their beliefs and behavioural engagement.

Strategies that centre on effective teacher instruction

Central to this type of didactical strategy is teacher's focus on clear explanations of the learning content, invoking student questions and focused lesson planning. Research confirms how teacher beliefs influence teacher instructional choices and practices (Rubie-Davies, Flint, & McDonald, 2012). Already early studies linked teachers' theoretical beliefs and instructional practices to teacher beliefs. For example, Johnson (1992) linked beliefs to opting for effective instruction in literacy development contexts. Haney, Czerniak and Lumpe (1996) linked teacher beliefs to science education and stressed not to ignore teacher beliefs. They state how pointless it is to push all kind of effective learning materials, new programs and new projects unless teachers do not move beyond the status quo in science education. They rather emphasise how programs should push teachers to become innovative, to take risks in the classroom, to adopt hands-on/minds-on, … approaches.

The former exemplifies how this didactical strategy also incorporates a strong focus on opting for evidence-based strategies. In this context, many studies centre on the relationship between teacher beliefs and technology integration in the classroom. The title of the paper of Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur and Sendurur (2012) points at the critical nature of this relationship "Teacher beliefs and technology integration practices: A critical relationship". Their paper initially reviews how choices of teachers in math, reading and science are heavily influenced by their pedagogical beliefs. But they extend this literature by focusing on the link with educational technology. They stress how – even innovative learning tools and environments such as science labs,

computers, Internet usage, do not automatically prompt teachers to adopt more student-centered or constructivist teaching approaches. To the contrary, they state, "The assumption, then, is that increased or prolonged technology use will actually prompt teachers to change their practices toward more constructivist approaches. While this may be true, it has yet to be verified by empirical research" (ibid, p.27). And they further continue on the same page "Although changes in these structures might create more opportunities for teachers to use student-centered approaches, other second-order barriers (i.e., barriers that are intrinsic to teachers and that challenge their beliefs about current practice) may limit their efforts "This summarizes how teacher choices for didactical strategies are to be linked to their core values about teaching and learning.

Strategies that help to organise the teaching activities

The focus on orderly conducted lessons, classroom management, time management, and teacher planning is very strongly linked to teacher/pedagogical beliefs. For instance, Pajares (1992) states explicitly: "there is a strong relationship between teachers' (pedagogical) beliefs and their planning, instructional decisions, and classroom practices" (ibid, p.326). Other authors state "teachers who believed that students must be controlled and cannot be trusted were also more likely to believe that extrinsic rewards are necessary to motivate the students (Woolfolk, Rosoff, & Hoy, 1990, p, 137). The latter illustrates how teacher-centred beliefs influence classroom management strategies. Hoy and Weinstein (2006) list clear examples how teacher's thinking about difficulties in classroom of teachers affects their practices. They exemplify this with research involving Haitian teachers. Whereas most teachers did not have difficulties with a group, she observed how one teacher struggled with the same group. The authors concluded the difficulty could "not reside in the children" but in that teacher's thinking. This teacher adopted a tradition stance and stressed consequences of behaviour, the other teachers rather stressed group membership, stressed less immediate consequences such as bringing shame to the group or family. The same authors also stress how differences in background culture of learners require teachers to be sensitive as to their beliefs about the origin of classroom disruption, being disaffected from school.

In a more recent study, authors focused on the link between classroom management, beliefs and bullying. They put forward the idea that how teachers think about the nature and origin of student behavior will affect the way teachers manage students. They exemplify this for instance as follows (Allen, 2010): "On the humanistic end of the continuum are democratic models that see misbehavior as an opportunity to learn. On the behavioristic end of the continuum are strategies that make use of punishment, coercion, and rewards. Thus, how a teacher manages student behavior is impacted by his or her assumptions about children, the models he or she adopts, and the strategies that are commensurate with these models". Especially in critical classroom context, such as the former, teachers are affected by their beliefs. Coles, Owens, Serrano, Slavec and Evans (2015) point for instance, at the way teacher adopt integer classroom practices and clearly state how teachers must hold certain beliefs to achieve effective integrity of classroom management. How acceptable do they consider intervention process? What attributes do they link to disruptive behaviour, to what extent do they want to talk to students, etc? They stress how teacher development programs should therefore not only initiate teachers in adopting particular interventions, but these development initiatives should also address teachers' beliefs.

Strategies to develop the positive classroom climate

Central to this type of didactical strategy is a focus on developing healthy student-teacher relationships and a congenial learning environment. Authors have explored the positive interrelationship between teacher beliefs and classroom climate-related strategies (Deemer, 2004). In her dissertation, Loh (2012) stresses how such teacher ideologies explicitly affect classroom climate. In particular, she stresses – based on observations and interview data – how teachers focus on rigor of instruction or teacher caring and how this affects their choices in teacher behavior and interactions with students.

Hornstra, Mansfield, van der Veen, Peetsma and Volman (2015) distinguished in their study between "teachers who mainly reported autonomy-supportive strategies and teachers who mainly reported controlling motivational strategies" (p.363) and how this affected classroom climate. They established an empirical link

between choosing either of these strategies and external factors (e.g., standards) and internal factors. The latter reflect teachers' beliefs related to (negative) perceptions of students' abilities, their behavior, background characteristics or motivation. Also in her book chapter, Rubie-Davies (2015) stresses how teachers' beliefs about differences between learners, expectations about learner outcomes, … directly affect the socio-emotional climate and instructional climate. She emphasizes that the way teachers think about the need to respond to students' emotional and social needs directly attributes to the way they interact with their students. In their book chapter Hoy and Weinstein (2006) stress how teachers' willingness to be there for them, to listen, and show concern for their personal and classroom life seems critical developing a positive relationship with students. Their input emphasizes this not only from the perspective of the teacher but also from a student perspective.

Discussing congruency in ITE context, authors conclude that "in the congruent teacher education, the education of (student) teachers (curriculum and practice of teacher educators) in line with the principles that are preached" (Swennen, Korthagen, & Lunenberg, 2004, p. 17). In a study on teacher educators, Swennen, Lunenberg and Korthagen (2008) found that "when supported, not only teacher educators' ability to link their own teaching to theory is improved but also congruent teaching help teacher educators to overcome their problems" (p. 531). When it comes to link congruency with reciprocal peer tutoring (RPT) strategy, there is only one author (see, Valcke, 2013) who explicitly explain that " there is an urgent need to recognise teacher training models that reflect a congruency with the way teachers are expected to teach (evidence-based) in their future practice" (p. 53).

CONCLUSIONS AND RECOMMENDATIONS

The above detailed discussion clearly reflects that the typology of Van De Grift (2007) reappears in the literature and key authors in the field reiterates the same didactical strategies. Also, there is a strong interrelationship between the teachers' pedagogical beliefs and the selection of didactical strategies in the initial teacher education setting. There is a dire need to establish a very precise and integrated bunch of didactical strategies for the preparation of future teachers. In ITE curriculum, teachers' pedagogical beliefs may be given due consideration while preparing future teachers. This theoretical analysis also provide an insight for the policy makers, curriculum developers, head teachers, and teacher educators to revisit the adoption of didactical strategies in the initial teacher education setting.

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