

Teacher beliefs, self-efficacy and professional vision: Disentangling their relationship in the context of inclusive teaching

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Educating student teachers to teach highly diverse groups of pupils has become one of the central tasks of teacher education programmes. Research on inclusive education has pointed to the need for more studies around student teachers' inclusive teaching competence. This study explores the extent to which student teachers' beliefs and self-efficacy related to inclusive teaching practices predict their professional vision of two inclusive classrooms' characteristics being (1) teacher-student interactions (TSI) and (2) differentiated instruction (DI). The data were collected from a sample of 1397 student teachers in Flemish primary teacher education institutions (N=8). The video and survey data were combined through multiple regression analysis. The findings indicate that student teachers' constructivist beliefs and self-efficacy in inclusive instruction contribute to the development of their professional vision of TSI and DI. The results are discussed with recommendations for teacher education programmes on inclusive teaching practices.

Keywords: teacher education, professional vision, teachers' beliefs, teacher self-efficacy, inclusion, teacher competences

Introduction

Educating student teachers in methods of teaching diverse learners has become one of the central responsibilities of teacher education programmes. Nowadays, schools have increasingly diverse classrooms and require teachers to provide instruction to diverse groups of students that meets their strengths and needs. This growing diversity has been responded to through educational policies (United Nations, 2007) and reform efforts towards more inclusive learning environments. The most widespread and well-known use of the concept of inclusive education is tied to the World Education Forum of 2000, which explicitly links inclusive education to the presence and participation of all marginalised groups of students, such as students with disabilities as well as students from ethnic minorities and from disadvantaged families (Operti et al., 2014). This article adopts the most recent formulation of inclusion in educational settings, which considers inclusive education not so much as a response to specific groups but rather as a call to transform educational systems at large to reach all students regardless of their background or specific educational needs (UNESCO, 2017). Policymakers have instigated educational reforms to uphold this global shift towards more inclusive education, making inclusive teaching an obligatory professional competence for teachers in many countries (Burns & Shadoina-Gersing, 2010).

Professional competence is defined as ‘what teachers actually need to act successfully during their professional life’ (Blömeke et al., 2008, p. 720). Current conceptualisations agree on the multidimensionality of professional competence, including *dispositions* (i.e. cognitive and dynamic-affective aspects, such as knowledge and beliefs), *situation-specific skills* (perception, interpretation and decision-making skills) and *classroom performances* (i.e. observable behaviour). Situation-specific skills are perceived as processes mediating the transformation of teachers’ cognitive and affective-motivational factors into professional performance (Blömeke et al., 2015). This means that these processes have a connecting role

between ‘what teachers know, believe and feel’ and ‘how they act’. A substantial number of studies on professional competence encourage researchers to focus on student teachers’ situation-specific skills as crucial to develop during teacher education (e.g., Blömeke et al., 2015; Santagata & Yeh, 2016). Situation-specific skills require three types of skills – perception, interpretation and decision-making, as introduced by Sherin and van Es (2002): student teachers (1) must be aware of what is important in a concrete situation, i.e., perception; (2) they must be able to interpret the situation drawing on their knowledge and experiences; and (3) they have to make relevant decisions. A growing body of teacher competence research focuses on teachers’ *professional vision* as a skill that encompasses their perception, interpretation and decision-making of crucial events in an instructional setting (e.g., Seidel & Stürmer, 2014; Sherin & van Es, 2009). This implies that professional vision is understood as a situation-specific skill as it involves the perception or identification of important classroom events, defined as ‘noticing’, and the ability to interpret these events based on one’s professional knowledge to make instructional decisions, which is defined as ‘reasoning’ (Sherin et al., 2008).

Several studies have revealed the importance of investigating the connection between separate components of professional competence in view of instructional behaviour and student learning outcomes (Blömeke et al., 2015; Santagata & Yeh, 2016). However, to date, there have been only limited studies investigating the relation between teachers’ dispositions and their professional vision (Bruckmaier et al., 2016; Meschede et al., 2017), especially with respect to inclusive teaching (Roose et al., 2019a). The present study will focus on two distinct aspects of student teachers’ dispositions, i.e. their beliefs and self-efficacy with respect to inclusive teaching and their association with the professional vision of inclusive classroom characteristics. Researchers have provided evidence that these aspects are important elements of teachers’ professional competence and are associated with their professional success and well-being (Klassen et al., 2011; Lauermann & König, 2016). Considering these findings – the

relationship between these different aspects of professional competence – might hamper or stimulate the successful implementation of inclusive teaching approaches in practice (Jensen et al., 2018). Results of this study are, thus, interesting for understanding student teachers' professional competence in responding to diversity in the classroom and, more importantly, understanding professional development initiatives that aim to foster student teachers' competence development regarding issues of diversity and inclusion.

Theoretical framework

Professional vision of inclusive classrooms (PVIC)

Professional vision refers to a teacher's ability to see and interpret aspects of classroom situations that are crucial for teaching and pupil learning (van Es & Sherin, 2002). Two main processes are highlighted here: 'noticing' and 'reasoning' (van Es & Sherin, 2008). Noticing involves the process of identifying important classroom events that are significant for pupil learning. It describes a teacher's skill of focusing on events that are important for learning (van Es & Sherin, 2008) or effective instructional practice (Stürmer et al., 2013). Reasoning implies the interpretation of noticed classroom events based on a teacher's professional knowledge (van Es & Sherin, 2008). This means that teachers' reasoning is often conceptualised as a knowledge-based process that guides their assessment of classroom situations. Previous studies on professional vision have been mainly focused on either the course-related aspects of teaching and learning, such as students' mathematical thinking, or on the general didactic components of teaching and learning, such as classroom management (Holodynski, 2017; Meschede et al., 2017; Seidel & Stürmer, 2014).

Professional vision in the domain of inclusive teaching consists of situation-specific processes and skills for noticing and reasoning about classroom events that are crucial for effective inclusive teaching (Keppens et al., 2019a). It is generally explored via video

instruments that provide student teachers with authentic inclusive classroom situations (Keppens et al., 2019a). Videos have the potential to foster the noticing and reasoning of significant events in video-taped authentic classroom situations through using strategies to guide attention on particular features of instruction. The present study investigates professional vision with regard to two dimensions of a teacher's ability that are essential for ensuring effective inclusive classrooms: teacher-student interactions (TSI) and differentiated instruction (DI). Both are observable in video clips representing inclusive classrooms. Numerous studies stress the importance of these dimensions for students' cognitive, affective and motivational outcomes (Roorda et al., 2011; Van Petegem et al., 2008), especially for marginalised groups of students with ethnic minority backgrounds, disabilities and low socioeconomic statuses (Hamre & Pianta, 2001; Roorda et al., 2011) because of their higher propensity to experience difficulties at school.

The first dimension stresses the importance of TSI for students' achievement and well-being (Roorda et al., 2011). It generally refers to the interaction between teachers and students in a classroom relationship and is part of the broader concept of the classroom climate (Englehart, 2009). The interaction between teachers and students depends on teachers' emotional support, and it contributes to building a safe classroom environment (Pianta & Hamre, 2009), as underlined by attachment theory (La Paro et al., 2004). Attachment theory highlights the importance of caregiving processes in relationships. A caring teacher is 'warm, close and communicative' and provides emotional support, rewards competence and promotes self-esteem, which benefits the school adjustment of marginalised groups of students (Pianta et al., 1995).

The second dimension aims to maximise each student's learning potential in the classroom (Tomlinson, 2004). DI is considered a highly promising approach for shaping inclusive classrooms and addresses student diversity in learning (Lawrence-Brown, 2004). It

starts from the premise that learners are different and learn differently (Fogarty & Pete, 2011). Struyven et al. (2016) refer to differentiated instruction as ‘dealing pro-active, positive and planned with diversity in learning between students (in terms of their readiness, interests and learning profiles) in the classroom in order to ensure the highest possible learning outcomes for every student’. Tomlinson (2004) argues that curriculum elements at the level of content, process and products can be differentiated to meet the needs of each child. Also, concepts such as ‘inclusion’, ‘student-centred’, ‘individualised instruction’ and ‘adaptive instruction’ are often used to define DI (Fox & Hoffman, 2011). These concepts aim to address student diversity by adopting specific teaching strategies and by varying learning activities in order to pursue optimal learning outcomes (Suprayogi et al., 2017).

Although both concepts – TSI and DI – are conceptually different and rooted in distinctive theoretical frameworks, they are inherently intertwined in practice (Roose et al., 2018). For instance, TSI is not only pivotal for students’ affective outcomes, such as well-being, welfare, motivation and involvement, but it is also pivotal for students’ cognitive achievements (Roorda et al., 2011), which DI attempts to optimise for all students (Tomlinson, 2004). Therefore, Roose and colleagues (2019a) refer to TSI and DI as the ‘complementary and mutually reinforcing elements to create classrooms that are sensitive and responsive to student diversity’ (pp. 142). Student teachers’ PVIC is, thus, conceptualised through these two critical components of teacher expertise.

Teacher beliefs in inclusive classrooms

The concept of ‘beliefs’ has been defined in a variety of ways and is considered a ‘messy construct’ (Pajares, 1992). Beliefs are often defined as psychologically held understandings, premises or propositions felt to be true (Richardson, 2003). According to Valcke et al. (2010), teachers’ beliefs can reflect issues related to learners, knowledge, teaching components,

themselves, parents, instruction and the organisational context. With respect to inclusive teaching, this study focuses on student teachers' constructivist beliefs as beliefs that refer to student-centred practices (Woolley et al., 2004) and professional beliefs about diversity (Pohan & Aguilar, 2001). Constructivist beliefs are related to the instructional context, while professional beliefs about diversity are related to learners. Student teachers' constructivist beliefs are relevant in the context of inclusive classroom practices as they refer to the degree to which a teacher thinks teaching practices should be accommodated to students' characteristics (Lee & Francis, 2018). Student teachers' professional beliefs about diversity capture their mindset towards differences among learners in terms of ethnicity, gender, sexual orientation, disabilities and socioeconomic status in a professional educational setting (Pohan & Aguilar, 2001). Research suggests that effective inclusive teachers hold positive beliefs about diversity, and this positively affects their efforts to effectively educate diverse groups of students (Blecker & Boakes, 2010; Lancaster & Bain, 2010). Teachers with constructivist beliefs tend to provide better learning support and more challenging tasks, which leads to higher student achievement (Voss et al., 2013).

Teacher self-efficacy in inclusive classrooms

Teachers' self-efficacy is commonly examined through the theoretical lens of Bandura's social cognitive theory (Tschannen-Moran & Hoy, 2001). According to Bandura (1997), in order to successfully complete a task, an individual needs certain knowledge and skills in addition to a sense of confidence so that their efforts will be successful (Park et al., 2016). Teacher self-efficacy refers to a teacher's personal judgements of their ability to bring about the desired outcomes of student engagement and learning (Tschannen-Moran & Hoy, 2001). This theory of self-efficacy has been successfully applied in many educational areas to measure student teachers' confidence in teaching. With respect to inclusive teaching, this study focuses on the theoretical concept of teachers' self-efficacy in implementing inclusive practices, as developed

by Sharma et al. (2012). The authors refer to three constructs of teachers' self-efficacy in implementing inclusive practices: self-efficacy in managing disruptive behaviours in the classroom, self-efficacy in inclusive instruction and self-efficacy in collaboration with parents and other professionals. These constructs are based on evidence that teaching students with different abilities in regular classrooms requires specific strategies that work with all students (Sharma et al., 2012). Teachers competent in using effective teaching strategies, collaborating with others and managing disruptive behaviours would likely be more efficacious when teaching in inclusive settings (Sharma et al., 2012).

The relation between professional vision, beliefs and self-efficacy

A promising theoretical approach for understanding the relationship between student teachers' beliefs and self-efficacy with the concept of professional vision is the model of competence, as proposed by Blömeke et al. (2015). They conceptualise competence as a continuum from *dispositions* followed by *situation-specific skills* and then *performance*. Disposition refers to cognitive (i.e. knowledge) and affect-motivational dispositions (i.e. beliefs and self-efficacy) that are transformed to situation-specific skills (such as professional vision), which then lead to observable behaviour or performance. According to Sherin and van Es (2002), professional vision is understood as a situation-specific skill as it involves the perception or identification of important classroom events (noticing) and the ability to interpret these events based on knowledge and experience (reasoning). This implies that professional vision in the domain of teaching consists of situation-specific processes and skills for noticing and reasoning about relevant events in the classroom (Sherin & van Es, 2009). Following Blömeke et al.'s (2015) framework, professional vision acts as a mediator between student teachers' dispositions, such as their beliefs and self-efficacy and classroom practice (see Figure 1). In other words, dispositions underlie professional vision, which, in turn, is supposed to be relevant for teaching

practice (Borko & Putnam, 1996). Student teachers' beliefs and self-efficacy work then as a selective filter or premise for their noticing and reasoning of classroom situations.

[Figure 1 here]

Teacher beliefs and professional vision of inclusive classrooms

Several researchers have argued that teachers' beliefs are crucial for the perception and interpretation of classroom situations (Leder et al., 2006; Santagata & Yeh, 2016). According to Pajares (1992), teachers' beliefs work as a filter through which new phenomena are interpreted. Teaching beliefs shape teachers' instructional judgements and actions (He & Levin, 2008) and pedagogical decisions (Cross & Hong, 2009). Teachers' beliefs are seen as a significant determinant of teaching approaches (Hermans et al., 2008). Based on these findings, research is interested in the way teachers' beliefs relate to their ability to notice and interpret (i.e. professional vision) classroom situations (Lee & Francis, 2018; Meschede et al., 2017). Research suggests that teachers may only pay attention to classroom situations that correspond with their existing beliefs about teaching and learning (Pajares, 1992). Several researchers support this assumption and have found comparable associations between teachers' content-specific and content-independent beliefs and professional vision. For example, van Es and Sherin (2008) found a relationship between teachers' beliefs about mathematics instruction and their ability to notice students' mathematical thinking. More recently, the study of Meschede et al. (2017) found that teachers' constructivist beliefs positively correlate with their professional vision of instructional support in science teaching. Also, Bruckmaier et al. (2016) found significant correlations between the way mathematics teachers react to video clips and their constructivist and transmissive beliefs. Recently, due to the growing diversity in pupil populations, educational research is strongly focused on teachers' beliefs in inclusive settings

(Keppens et al, 2019b; Roose et al., 2019a). This is exemplified in the quantitative study of Roose et al. (2019a), which indicates a positive relationship between secondary teachers' professional beliefs about diversity and their ability to notice inclusive classroom characteristics. A similar relationship was found between their beliefs about differentiating the curriculum and their capacity to notice aspects of an inclusive classroom. We expect similar correlations to exist in the context of teacher education on inclusive primary education.

Hypothesis 1. Constructivist and positive beliefs about diversity are positively associated with student teachers' professional vision (i.e. noticing and reasoning) of inclusive classroom characteristics (i.e. TSI and DI) (see Figure 1).

Teacher self-efficacy and professional vision of inclusive classrooms

Bandura (1997) argued that one of the core elements of self-efficacy is being able to predict occurrences in the classroom and deciding how to deal with them. Teachers' self-efficacy serves as a cognitive filter that shapes their thoughts and actions (Woolfolk Hoy et al., 2009). Research indicates that teachers' confidence in their abilities influences the way they teach (Mansour, 2009) and thus shapes their ability to notice and interpret classroom situations to make instructional decisions. In this light, Anderson et al.'s (1988) study demonstrated a relationship between student teachers' sense of self-efficacy and their reasoning skills. Sancar-Tokmak (2013) showed how pre-service science teachers' analysis of classroom videos representing expert teachers in a real classroom environment is related to their self-efficacy. They found that student teachers' science teaching self-efficacy increased after analysing classroom videos of expert teachers on their instruction strategies and teaching methods. However, research investigating the influence of student teachers' self-efficacy on their professional vision is still lacking. So far, research appears to mainly focus on the association between student teachers' general pedagogical knowledge (GPK), which generally underlies their professional vision of content-independent skills (König et al., 2014) and self-efficacy (Depaepe & König, 2018).

Based on data from 119 in-service primary and secondary school teachers, Lauermann and König (2016) found a positive association between teachers' self-efficacy and GPK. Considering the relation between GPK and professional vision on the one hand and GPK and self-efficacy on the other, we expect to find similar relations between student teachers' professional vision and self-efficacy in the context of inclusive teaching.

Hypothesis 2. Student teachers' self-efficacy in implementing inclusive practices is positively associated with student teachers' professional vision (i.e. noticing and reasoning) of inclusive classroom characteristics (i.e. TSI and DI) (see Figure 1).

Research goal and questions

Research on student teachers' professional competence in general, and on professional vision in particular, has pointed to the need for more studies on the relationship between different facets of competence (Blömeke et al., 2015). This study builds on a recent teacher competence model developed by Blömeke et al. (2015), which conceptualises teachers' professional competence as a multidimensional construct encompassing different types of personal resources (i.e. dispositions, situation-specific skills and performances in a professional context). Blömeke et al. (2015) argued for the investigation of the relationship between these different facets of competence through different assessment approaches in order to achieve a holistic understanding of teacher competence. However, no studies on these relationships have been conducted in the context of teacher education on inclusive teaching. Therefore, the aim of this study is to explore the extent to which student teachers' beliefs and self-efficacy with respect to inclusive teaching relates to their professional vision of two inclusive classroom characteristics being (1) TSI and (2) DI. The following research hypotheses are addressed:

- **Hypothesis 1.** Constructivist and positive beliefs about diversity are positively associated with student teachers' professional vision (i.e. noticing and reasoning) of inclusive classroom characteristics (i.e. TSI and DI) (see Figure 1).
- **Hypothesis 2.** Student teachers' self-efficacy in implementing inclusive practices is positively associated with their professional vision (i.e. noticing and reasoning) of inclusive classroom characteristics (i.e. TSI and DI) (see Figure 1).

Method

Sample

The data were collected in October 2017 from student teachers in primary teacher education institutions in Flanders (Flemish part of Belgium). These institutions are colleges of higher education in which a bachelor's degree (180 ECTS) usually takes three years of study to complete. Eight primary teacher education institutions were randomly selected from a list of 14 institutions provided by the Flemish Ministry of Education. Although the institutions were chosen randomly, each geographical region in Flanders was equally represented in the sample. Each institution was contacted (eight in total) and agreed to participate. Through the head of the primary teacher education institution, student teachers' e-mail addresses were gathered. In total, 2766 primary teacher education students received an online link to fill out the measurement instruments on a voluntary basis. From the 2766 student teachers that were invited, 1397 students participated (response rate of 51%) and provided data for each of the study variables. The characteristics of the final sample include a high proportion of female students (see Table 1). As this is congruent with previous studies on the gender division in primary teacher education in Flanders, our sample can be considered as representative in terms of gender division (Struyven et al., 2010). The age of the respondents ranged between 18 and 56 years, with a mean age of 21 years. This is congruent with previous descriptions of the

Flemish teacher education population (Struyven & De Meyst, 2010) and indicates a representative sample in terms of age distribution.

[Table 1 here]

Measures and procedure

Two types of data were used to measure the central concepts: video data and survey data. First, student teachers' PVIC was investigated by using a validated and standardised video-based comparative judgement instrument to measure two dimensions of effective inclusive classroom components, i.e., TSI and DI (Roose et al., 2018; Keppens et al., 2019a). Second, student teachers' constructivist beliefs, professional beliefs about diversity and self-efficacy in implementing inclusive practices were measured using validated scales by means of a questionnaire. Both were entered into an online platform. They received an online link and password to login onto the platform.

Professional vision measured by using a video-based comparative judgement instrument

Noticing. The video-based comparative judgement instrument measures student teachers' noticing of TSI and DI through the method of comparative judgement (Pollitt, 2012). Video-based comparative judgement requires student teachers to compare pairs of short video clips and decide which of the videos is best regarding TSI and DI (See Figure 2). The algorithm randomly presents pairs of videos to the student teachers. In total, the student teachers made 10 comparisons out of 15 video clips. They were asked to judge which clip is best in terms of TSI and DI by choosing one video over another. This was done by using the following prompt: 'specify in which video the teacher works more inclusively in his or her interactions with the students (video A or B)' and 'specify in which video the teacher works more inclusively in his

or her instruction and teaching methods (video A or B)’ (see Figure 2). To do so, the student teachers had to identify classroom situations related to TSI and DI that stand out as quality features of effective inclusive teaching (Keppens et al., 2019a). These comparisons result in a ranking of the video clips (Gheysens et al., 2017). Student teachers’ ranking was then compared to the valid and reliable rank order of an expert group (N = 34). This comparison is done by means of a *misfit* measure (Pollitt, 2012). It refers to the extent to which individual student teachers’ judgements of the video clips deviate from the expert benchmark. The lower the *misfit* score, the more congruent the student teachers are with the experts’ ability to notice (Keppens et al., 2019a; Keppens et al., 2019b) or the higher their skills to notice TSI and DI. Comparing student teachers to a group of experts is based on literature on the expert-novice paradigm showing that noticing skills are a distinctive feature of experts (Sabers et al., 1991).

[Figure 2 here]

Reasoning. To measure student teachers’ reasoning about TSI and DI, rating items were connected to the video clips. The student teachers were asked to rate how decisive each item was when choosing one video clip over another with regard to TSI on the one hand and DI on the other. The items were constructed based on experts’ comments on the content of the video clips (Keppens et al., 2019a; Roose et al., 2018). Every item, 26 for TSI and 28 for DI, was assessed on a 5-point Likert scale (0 = not important, 4 = very important). Roose et al. (2018) and Keppens et al. (2019a) found that TSI and DI are conceptually and empirically separable, and a Principal Component Analysis (PCA) confirmed both TSI and DI as separate one-dimensional latent variables. Ten items targeting TSI and eight items targeting DI were deleted due to low factor loadings, indicating a low communality with the rest of the two scales. Some sample items of the final scales are as follows: ‘*The teacher pays attention to students’ talents*

(item TSI)'; 'The teacher uses activating teaching methods (item DI)'. Cronbach's alpha was .71 for TSI and .75 for DI.

Variables measured by using validated scales

Constructivist beliefs. The 'Constructivist Teaching Beliefs' scale of Woolley et al. (2004) was used. The items were assessed along a 6-point continuum ranging from strongly disagree to strongly agree. In this study, the participants were asked to rate their level of agreement with a specific statement (from 0, strongly disagree to 5, strongly agree). The scale consists of 13 items. Item example: '*I involve students in evaluating their own work and setting their own goals*'. A PCA confirmed the factor structure. Also, a confirmatory factor analysis revealed a good model fit for the scale ($\chi^2=4081,647$; $df = 78$; $p \leq 0.001$; $CFI = .957$; $TLI = .938$; $RMSEA = .054$; $SRMR = .039$). The reliability of the scale is good (Cronbach's $\alpha = 0.84$).

Student teachers' professional beliefs about diversity. The 'Professional Beliefs about Diversity' scale of Pohan and Aguilar (2001) was used and adapted to the Flemish context by Vantieghem et al. (2018). The adapted professional beliefs about diversity scale includes 14 items that measure student teachers' beliefs related to the professional educational context with respect to five different dimensions of diversity: ethnicity, disabilities, sexual orientation, gender and SES. The scale includes items such as '*you cannot expect a teacher to support a child with a disability in general education*'. The items were rated on a 5-point Likert scale (0 = strongly disagree to 4 = strongly agree) and divided between positive and negative items. The items referring to negative beliefs were reverse coded, so the higher scores on the scale demonstrated more positive professional beliefs about diversity. The scale was constructed using a mean sum of scores. A PCA and confirmatory factor analysis provided evidence for the factor structure ($\chi^2=2050,464$; $df = 91$; $p \leq 0.001$; $CFI = .926$; $TLI = .903$; $RMSEA = .044$; $SRMR = .042$). Cronbach's alpha was 0.65.

Self-efficacy in implementing inclusive practices. The ‘Teacher Efficacy for Inclusive Practices (TEIP)’ scale was used to measure student teachers’ self-efficacy in implementing inclusive practices (Sharma et al., 2012). TEIP measures perceived efficacy in teaching in the context of inclusion. The TEIP scale can be divided into three subscales: (1) self-efficacy in using inclusive instruction, (2) self-efficacy in managing disruptive behaviour and (3) self-efficacy in collaboration (Sharma et al., 2011). Only the first two scales are used in this study as they are more suitable to the context of teacher education. The subscale for self-efficacy in dealing with disruptive behaviour contains six items that are rated on a 6-point scale (0 = strongly disagree to 5 = strongly agree). Item example: *‘I can control disruptive behaviour in the classroom’*. Cronbach’s alpha was 0.77. The subscale for self-efficacy in inclusive instruction contains six items that are also rated on a 6-point scale (0 = strongly disagree to 5 = strongly agree). Item example: *‘I am confident in designing learning tasks so that the individual needs of students with disabilities are accommodated’*. Cronbach’s alpha was 0.76. A PCA approved the factor structures for both latent variables (i.e. self-efficacy behaviour and self-efficacy inclusive instruction). A confirmatory factor analysis revealed a good model fit for the ‘self-efficacy in dealing with disruptive behaviour’ scale ($\chi^2=1548,945$; $df=15$; $p \leq 0.001$; $CFI = .990$; $TLI = .981$; $RMSEA = .050$; $SRMR = .021$) and the ‘self-efficacy in inclusive instruction’ scale ($\chi^2=915,476$; $df=15$; $p \leq 0.001$; $CFI = .979$; $TLI = .955$; $RMSEA = .060$; $SRMR = .025$).

Data analysis

Because of the hierarchical nature of our data (i.e. individual student teachers nested within teacher education institutions), we investigated whether there was sufficient statistical independence or a salient teacher education level effect. To accomplish this, we separately calculated the intraclass correlation for each dependent variable (i.e. the variables ‘noticing TSI’, ‘noticing DI’, ‘reasoning TSI’ and ‘reasoning DI’) and each independent variable (i.e. the variables ‘constructivist beliefs’, ‘beliefs about diversity’, ‘self-efficacy behaviour’ and ‘self-

efficacy inclusive instruction'). Our analysis showed that less than 3% of the variance in the dependent and independent variables was attributed to the organisational level. Moreover, these variances did not differ significantly from 0. This means that they varied only slightly by teacher education institutions, and our observations can thus be treated as statistically independent (Hox, 2013).

Further preliminary analyses showed that the demographic variables of gender, immigrant background and teaching experience were not systematically related to the dependent and independent variables at a .05 significance level. Therefore, in order to facilitate a model estimation, we excluded these demographic variables from all further analyses. Only the demographic variable *study year* is related to the dependent and independent variables, although not systematically. We tested all the hypotheses using multiple linear regression analysis in SPSS. A model was constructed with student teachers' beliefs, self-efficacy and *study year* as the independent variables and student teachers' noticing and reasoning of TSI and DI as the dependent variables. To improve the interpretability of the results based on the effect sizes, the dependent variables were standardised. The significance level was .05 for all the analyses. The multicollinearity was assessed for all the variables prior to the regression analysis, which showed good tolerance and VIF measures.

Results

Descriptive statistics

The descriptive statistics and correlations between the investigated variables are presented in Table 2. For student teachers' professional vision (i.e. noticing and reasoning) of TSI and DI, the results indicate that the student teachers' noticing outcome (i.e. misfit) for both TSI (M=1.735, SD=0.605) and DI (M=1.497, SD=0.662) is relatively low. As we calculated the student teachers' noticing outcome by comparing their results to those of an expert group by

means of a misfit measure (see method section), the results indicate that the student teachers' misfit measure is rather low. This means that their ability to notice TSI and DI is more congruent with the experts' ability to notice. These results are comparable with teachers' mean scores for noticing TSI and DI, which is reported in the study of Roose et al. (2019b). In addition, student teachers' reasoning skills regarding TSI ($M=2.86$, $SD=0.43$) and DI ($M=2.90$, $SD=0.42$) are moderate to high. For beliefs about diversity, the mean is rather low ($M=1.84$, $SD=0.23$), while the mean score for constructivist beliefs is rather high ($M=3.24$, $SD=0.38$). The mean scores for self-efficacy in dealing with disruptive behaviour ($M=3.34$, $SD=0.57$) and self-efficacy in inclusive instruction ($M=3.59$, $SD=0.52$) are moderate to high. The correlation matrix shows significant positive and negative correlations among the study variables (see Table 2). However, non-significant relations were found between student teachers' noticing and reasoning.

[Table 2 here]

The relation between beliefs and professional vision (i.e. noticing and reasoning) of TSI and DI) (H1)

Concerning hypothesis 1, we focused on the relation between student teachers' beliefs and PVIC, including noticing TSI, noticing DI, reasoning TSI and reasoning DI. The results showed that student teachers' professional beliefs about diversity ($F(4,1045)=2.967$, $p=.019$) and constructivist beliefs ($F(4,1045)=35.251$, $p=.000$) significantly predict their PVIC ($p < .05$).

Table 3 shows the results of the regression analyses for the predictor variables, including student teachers' study year. For student teachers' noticing of TSI, no significant relation was found between the independent variables. Only student teachers' study year is significantly related to their noticing of TSI. Student teachers' noticing misfit for TSI decreases from the first year to the third year. This means that student teachers in their last year deviate less from experts compared to student teachers in the first grade. For student teachers' noticing of DI, a

significant relation was found between their constructivist beliefs and the study year. The average DI noticing score (i.e. misfit) decreases by .138 as student teachers increase 1 point on the constructivist beliefs scale. This suggests that the more student teachers hold constructivist beliefs, the more congruent they are with experts' ability to notice DI. Moreover, the results suggest that student teachers' noticing misfit for DI decreases from the first year to the third year, indicating that last-year students deviate less from experts compared to first grade students.

For student teachers' reasoning skills, the average TSI reasoning score increases by .265 and .059 as student teachers increase 1 point on the constructivist beliefs scale and the professional beliefs about diversity scale. The average DI reasoning score increases by .305 and .071 as student teachers increase 1 point on the constructivist beliefs scale and the professional beliefs about diversity scale. This indicates that the higher student teachers' scores on the belief scales, the more they relate to experts' ability to reason about TSI and DI. Also, student teachers' study year is significantly related to their reasoning of TSI and DI. Our results show that student teachers' reasoning scores for TSI and DI decreases from the first year to the third year. This suggest that student teachers rely on different frames of reference to analyse videos during teacher preparation (Roose et al., 2018). Where first-year students focus more on their own experiences and opinions when analysing classroom videos, final year students interpret classroom events more on the basis of their knowledge about teaching (Keppens et al., 2019b), making them more critical in their reasoning about both TSI and DI.

[Table 3 here]

Next, four multiple regression analyses were conducted with the four dimensions of PVIC as separate dependent variables and the two belief scales as independent variables to investigate the proportions of variance. Table 4 presents the proportions of variance accounted for by the four models and the significance of the models.

[Table 4 here]

We conclude that the amount of variance explained by the belief scales is most notable for noticing DI and reasoning DI. Here, student teachers' constructivist beliefs and professional beliefs about diversity explain 11% and 10.4% of the variance. For the other dimensions of PVIC, the variance explained by student teachers' beliefs is rather small, although all of them are significant at the 0.001 level.

The relation between self-efficacy and professional vision (i.e. noticing and reasoning) of TSI and DI (H2)

For hypothesis 2, this study focused on the relation between student teachers' self-efficacy in inclusive instruction and self-efficacy in dealing with disruptive behaviour as independent variables and student teachers' PVIC (i.e. noticing TSI, noticing DI, reasoning TSI and reasoning DI) as the dependent variable. The results showed that the variables self-efficacy instruction ($F(4,715)=20.187$, $p = .000$) and self-efficacy behaviour ($F(4,715)=18.069$, $p = .000$) made a statistically significant contribution. The control variable *study year* was added to the model.

Table 5 shows the results of the regression analyses for the predictor variables. For student teachers' noticing skills, no significant relation was found between their ability to notice TSI and both self-efficacy constructs. Only student teachers' study year is related to their noticing of TSI. The student teachers' noticing misfit for TSI decreases from the first year to the third year. This means that student teachers in their last study year deviate less from experts

compared to student teachers in the first grade. Student teachers' ability to notice DI is related to both self-efficacy in inclusive instruction and self-efficacy in managing difficult behaviour in the classroom. The average DI noticing score decreases with $-.133$ as student teachers increase 1 point on the self-efficacy in inclusive instruction scale. This suggests that the higher student teachers' self-efficacy in inclusive instruction, the more congruent student teachers are with experts' ability to notice DI. The average DI noticing score increases by $.149$ as student teachers increase 1 point on the self-efficacy in managing difficult behaviour scale. This suggests that the higher the student teachers' self-efficacy in dealing with disruptive behaviour the more they differ from experts in noticing DI.

For student teachers' reasoning skills, their ability to reason about TSI and DI is influenced by both self-efficacy constructs. The average TSI reasoning score increases by $.198$ and $.130$ as student teachers increase 1 point on the self-efficacy in inclusive instruction and managing difficult behaviour in the classroom scale. Moreover, the average DI reasoning score increases by $.218$ and $.159$ as student teachers increase 1 point on the self-efficacy in inclusive instruction and managing difficult behaviour in the classroom scale. This means that the higher student teachers' self-efficacy in implementing inclusive practices the more similar they are to experts in how they reason about video clips. Also, student teachers' study year is significantly related to their reasoning of TSI and DI. Our results show that student teachers' reasoning scores for TSI and DI decrease from the first year to the third year, suggesting that they become more critical in their reasoning about both TSI and DI.

[Table 5 here]

Next, we conducted four multiple regression analyses with the four dimensions of PVIC as separate dependent variables and the two self-efficacy constructs as independent variables. Table 6 presents the proportions of variance accounted for by the four models and the significance of the models.

[Table 6 here]

We conclude that the amount of variance explained by the factors of self-efficacy in implementing inclusive practices is most notable for noticing DI and reasoning DI. Here, self-efficacy in implementing inclusive practices explains 10.7% and 11.9% of the variance. For the other dimensions of PVIC, the variance explained by student teachers' self-efficacy is small, although they are significant at the 0.05 level.

Discussion

This study examined to what extent student teachers' constructivist beliefs, professional beliefs about diversity, self-efficacy in inclusive instruction and self-efficacy in dealing with disruptive behaviour can be understood as a premise for their professional vision (i.e. noticing and reasoning) of inclusive classrooms (PVIC). Professional vision is investigated via two dimensions of teacher expertise considered to be important for ensuring effective inclusive classrooms: (positive) TSI and DI.

Our findings enhance the empirical understanding of student teachers' inclusive teaching competence and are a valuable supplement to the work of other researchers on how student teachers' beliefs and self-efficacy influence the way they perceive and interpret classroom practices. This study provides critical clues for the design of professional development initiatives in teacher education concerning effective inclusive teaching.

The relation between beliefs and professional vision of TSI and DI

With respect to student teachers' noticing, our results show that their beliefs only contribute to their noticing of DI. In particular, only student teachers' *constructivist beliefs* relate to their noticing of DI. Our findings indicate that the more teachers hold constructivist beliefs, the better they notice aspects of inclusive classroom characteristics related to DI. This is possibly because DI literature explicitly links DI to constructivist instructional approaches whereby DI is often referred to as 'student-centred' (Fox & Hoffman, 2011). In this light, the study of Suprayogi et al. (2017) found a significant association between DI implementation and teachers' constructivist beliefs. This is analogous to the findings of De Neve et al. (2015). Moreover, Meschede et al. (2017) found that teachers' constructivist beliefs are positively related to teachers' ability to notice instructional practices (Meschede et al., 2017).

Student teachers' low mean score on the *professional beliefs about diversity* scale might explain the lack of association between their noticing of TSI and DI. Those negative beliefs might hinder the perception of classroom activity in videos on TSI and DI. Therefore, teacher preparation should focus more on transforming student teachers' beliefs about diversity. Several studies have found that student teachers' beliefs are likely to change or develop through additional training in meeting the needs of learners with diverse educational needs (Taylor & Ringlaben, 2012) through positive experiences in working with students in the classroom (Killoran et al., 2014) or through reflection about teaching and learning (Stuart & Thurlow, 2000). Teacher education programmes should acknowledge this when designing training on inclusive teaching. The pedagogy of realistic teacher education (Korthagen et al., 2001) is exemplary in this context. This approach starts from concrete practical problems and concerns experienced by student teachers in real contexts. It focuses on the systematic reflection of student teachers' own teaching practices and that of their fellow students. Video analysis can be used for this purpose; they capture the complexity, authenticity and multiplicity of teaching

in such a way that it encourages a systematic inquiry of classroom practices (Sherin & van Es, 2009). A typical use of video involves viewing and discussing short, edited segments of videos as a way to stimulate productive reflection and conversation among student teachers around issues of teaching and learning. Tripp and Rich (2012) stress that video reflection allows teachers to identify the gaps between their beliefs about good teaching and their actual teaching practice. Such an alternative way of preparing student teachers for inclusive teaching might benefit student teachers' beliefs as well as their professional vision, which in turn might influence their teaching practice.

While student teachers' beliefs barely contribute to student teachers' noticing, these beliefs seem to be a relevant premise for reasoning about inclusive classroom characteristics related to both TSI and DI. Our results provide evidence that interpreting inclusive classroom situations strongly depends on the beliefs that student teachers hold in educational settings. These results let us conclude that noticing and reasoning are two separate cognitive dimensions and skills. The correlation matrix in Table 2 provides empirical evidence for this indication. König et al. (2014) argued that the skill to notice and the skill to interpret are only loosely connected, which suggests that they are in fact two separable dimensions. Moreover, their study provides evidence for the idea that reasoning about TSI and DI is merely a knowledge-based process (compared to noticing) guided by teachers' GPK. Previous research found student teachers' beliefs to be related to their knowledge of effective teaching strategies (Hativa et al., 2001).

The relation between self-efficacy and professional vision of TSI and DI

With respect to student teachers' noticing, only student teachers' noticing of DI varies in relation to their self-efficacy. We found that the higher student teachers' *self-efficacy in inclusive instruction*, the more they will notice aspects of inclusive classroom characteristics

related to DI. In contrast, the higher student teachers' *self-efficacy in managing difficult behaviour*, the less they will notice aspects of inclusive classroom characteristics related to DI. This might not be surprising considering that the concept of DI is often linked to the theory on inclusive instruction (Lawrence-Brown, 2004). De Neve et al. (2015) revealed that teachers' self-efficacy is a predictor of beginning teachers reporting changes in their DI practices. Beginning teachers who believe in their ability to address diverse learning needs adapt their instructional methods to students' learning needs more easily. Donnell and Gettinger (2015) explained how higher self-efficacy goes with higher positive perceptions of reform and an amenability to implementing DI.

While student teachers' self-efficacy contributes only to their noticing of DI, these self-efficacy constructs contribute to student teachers' reasoning of DI as well as TSI. The higher student teachers' self-efficacy in inclusive instruction and managing difficult behaviour, the higher their reasoning skills regarding inclusive classroom characteristics. These self-efficacy constructs seem to be a relevant premise for reasoning about inclusive classroom characteristics. Previous research found student teachers' reasoning to be informed by different aspects of professional knowledge (König et al., 2014; Seidel & Stürmer, 2014) depending on the focus of the subject under investigation. Bandura (1997) argued that a greater knowledge base is correlated with gains in self-efficacy. He argued that self-efficacy beliefs are critical determinants of how well knowledge is acquired. The same results were confirmed by Koh and Shin (2017) in the context of inclusive teaching. They found that student teachers' knowledge is positively related to their self-efficacy in teaching students with special educational needs.

Limitations and suggestions for further research

This study found that student teachers' PVIC varies slightly in relation to their beliefs and self-efficacy. This implies that the proportion of variance in student teachers' PVIC explained by student teachers' beliefs and self-efficacy should not be 'overinterpreted' as much of the

variance was left unexplained. We could expect that a variation in student teachers' professional vision is affected by the teacher education institution. However, student teachers' responses in our sample were not attributed to the organisational level, suggesting that Flemish teacher education institutions are, to some extent, common with regard to preparing student teachers for inclusive teaching. This might be because each teacher education institution in Flanders was confronted with extensive demands for curriculum reform as a result of the growing diversity in pupil populations aligned with the implementation of more inclusive learning environments in schools.

Other variables might explain the variation in student teachers' PVIC. For example, the study of Roose et al. (2019a) shows how teachers' beliefs about differentiating the curriculum are related to their ability to notice inclusive classroom characteristics. Furthermore, aspects of teacher competence, such as student teachers' motivation to teach, might explain the variation in student teachers' PVIC.

We must be cautious when interpreting the results of this study as it involves cross-sectional data. In order to draw causal conclusions, intervention studies could examine how changes in student teachers' beliefs and their self-efficacy affect their professional vision of inclusive classroom characteristics. The video-based assessment instrument can then be used in a pretest-posttest design to study the effectiveness and impact of teacher preparation interventions.

Another limitation is that this study focuses only on two dimensions of effective inclusive classrooms, namely (positive) TSI and DI. Both concepts are observable through our video-based assessment instrument and are essential for effective inclusive teaching. However, more dimensions of effective inclusive classrooms could be considered in order to fully capture student teachers' PVIC. For example, literature on inclusiveness also discusses approaches such

as collaborative teaming, co-teaching, culturally relevant pedagogy, cognitive strategy instruction and peer-assisted learning.

Conclusion

This study adds relevant results regarding the empirical understanding of generic competences in general, and professional vision in particular, in the context of teacher preparation in inclusive teaching. This study explored how different aspects of Blömeke et al.'s (2015) competence model are related. More specifically, this study investigated the relationship between student teachers' beliefs and self-efficacy in the context of inclusive teaching on the one hand and student teachers' professional vision (i.e. noticing and reasoning) of two key aspects of effective inclusive classrooms (i.e. TSI and DI) on the other. Our findings indicate that student teachers' constructivist beliefs and self-efficacy in inclusive instruction contribute to the development of student teachers' noticing and reasoning of inclusive classroom activity. Student teachers will be more inclined to notice and interpret inclusive classroom activity in video clips when they hold beliefs that relate to student-centred practices and when they are confident in their ability to use inclusive instruction. Both are beneficial for the implementation of equitable learning environments.

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Appendix

List of tables

Table 1. Sample characteristics

Table 1.

Sample characteristics

	% (n)
Gender	
Male	13.5 (188)
Female	86.5 (1209)
Study year	
First Bachelor year	43.1 (602)
Second Bachelor year	30.6 (427)
Third Bachelor year	26.3 (368)
Immigrant background*	
Yes	8.7 (122)
No	91.3 (1275)
Teaching experience (internships)	
No	30.1 (414)
Short internship (less than two weeks)	41.2 (566)
Long internship (more than two weeks)	28.7 (394)

*Note: immigrant background is defined as having a foreign-born grandparent.

Table 2. Means (M), standard deviations (SD) and correlations among the study variables (n=1397)

Table 2.

Means (M), standard deviations (SD) and correlations among the study variables (n=1397)

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.
1. Noticing TSI	1.74	.61	-							
2. Noticing DI	1.50	.66	-.013	-						
3. Reasoning TSI	2.86	.43	.028	.026	-					
4. Reasoning DI	2.90	.42	.043	-.017	.778**	-				
5. Beliefs about diversity	1.84	.23	.063*	.039	.063*	.078*	-			
6. Constructivist beliefs	3.24	.38	-.056	-.182**	.249**	.282**	.008	-		
7. Efficacy behaviour	3.34	.57	.036	.089*	.248**	.289**	.028	.176**	-	
8. Efficacy instruction	3.59	.52	.058	-.076*	.264**	.297**	-.025	.315**	.593**	-

*p < .05; **p < .01

Table 3. Regression analyses of the effect of professional beliefs about diversity and constructivist beliefs on student teachers' PVIC, including noticing TSI, noticing DI, reasoning TSI and reasoning DI (n=1397)

Table 3.

Regression analyses of the effect of professional beliefs about diversity and constructivist beliefs on student teachers' PVIC, including noticing TSI, noticing DI, reasoning TSI and reasoning DI (n=1397)

Variable	Noticing TSI				Noticing DI				Reasoning TSI				Reasoning DI			
	df	B	SE	Beta	df	B	SE	Beta	df	B	SE	Beta	df	B	SE	Beta
		B				B				B				B		
Beliefs diversity	3	.242	.133	.056	3	.086	.127	.020	3	.254	.129	.059*	3	.307	.127	.071*
Constructivist beliefs	3	-.104	.084	-.038	3	-.375	.080	-.138**	3	.723	.082	.265**	3	.830	.081	.305**
Study year	3	-.131	.038	-.107**	3	-.345	.036	-2.83**	3	-.122	.037	-.100**	3	-.178	.036	-.146**

*p<.05;**p<.001

Table 4. Proportion of variance and significance of each model with student teachers' beliefs

Table 4.

Proportion of variance and significance of each model with student teachers' beliefs

	Noticing TSI	Noticing DI		Reasoning TSI	Reasoning DI
F(3,1051)	6.469**	44.170**	F(3,1049)	28.761**	41.512**
Adjusted R ²	.015	0.110	Adjusted R ²	0.074	0.104

*p<.05; **p<.001

Table 5. Regression analyses of the effect of self-efficacy in implementing inclusive practices on student teachers' PVIC, including noticing TSI, noticing DI, reasoning TSI and reasoning DI (n=1397)

Table 5.

Regression analyses of the effect of self-efficacy in implementing inclusive practices on student teachers' PVIC, including noticing TSI, noticing DI, reasoning TSI and reasoning DI (n=1397)

	Noticing TSI				Noticing DI				Reasoning TSI				Reasoning DI			
Variable	df	B	SE	Beta	df	B	SE	Beta	df	B	SE	Beta	df	B	SE	Beta
			B				B				B				B	
Self-efficacy instruction	3	.148	.090	.075	3	-.241	.079	-.133**	3	.382	.084	.198**	3	.426	.084	.218**
Self-efficacy behaviour	3	-.021	.082	-.012	3	.249	.072	.149*	3	.228	.077	.130*	3	.285	.077	.159**
Study year	3	-.145	.052	-.105*	3	-.363	.046	-.285**	3	-.119	.049	-.088*	3	-.160	.049	-.117**

*p<.05; **p<.001

Table 6. Proportion of variance and significance of each model with student teachers' self-efficacy

Table 6.

Proportion of variance and significance of each model with student teachers' self-efficacy

	Noticing TSI	Noticing DI		Reasoning TSI	Reasoning DI
F(3,720)	3.421*	29.607**	F(3,719)	23.933**	33.391**
Adjusted R ²	.010	.107	Adjusted R ²	0.087	0.119

*p<.05; **p<.001

List of figures

Figure 1. Model of competence as a continuum based on Blömeke et al. (2015) adjusted with respect to the specific constructs of this study.

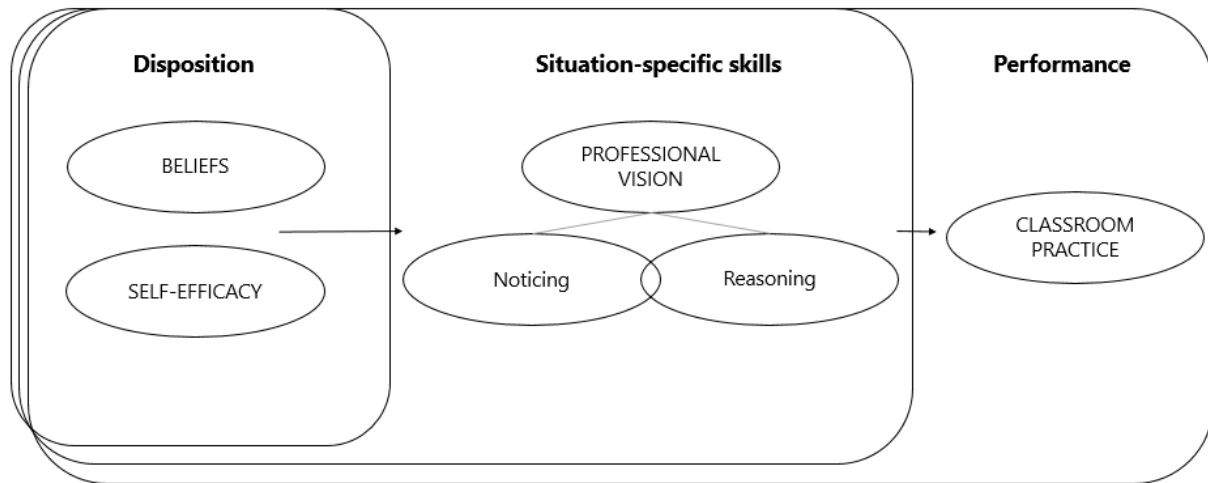



Figure 2. Comparative judgement as a measure of student teachers' noticing.




Videografie instrument basisonderwijs

7%


Videovergelijking 1

CLIP A



0:00 / 3:00

CLIP B



0:00 / 0:38

Beoordeel interacties

Geef aan in welke clip de leraar het meest inclusief werkt in zijn/haar interacties met de leerlingen.

☐ CLIP A

☐ CLIP B


Beoordeel werkvormen en aanpak

Geef aan in welke clip de leerkracht het meest inclusief werkt in zijn/haar werkvormen en aanpak.

☐ CLIP A

☐ CLIP B

Antwoord doorsturen



AGENTSCHAP INNOVEREN & ONDERNEMEN

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