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Factors Influencing the Evolution of Vocational Teachers' Beliefs and Practices Related to Classroom Management during Teacher Education

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Abstract: Two studies were conducted to investigate the evolution of 71 Swiss vocational teachers' classroom management as a result of the inputs of a teacher education program, and to identify the factors that encouraged or impeded teacher change. Study 1 consisted of a longitudinal survey, and Study 2 of interviews. Longitudinal analyses were performed using a multilevel approach. This mixed-method study revealed that vocational teachers' classroom management evolved towards the beliefs and practices encouraged by the teacher education program. Years of prior teaching experience and motivations for choosing teaching were found to moderate teachers' evolutions. Moreover, influential people, providing alternative strategies for teachers to try in their classrooms, and questioning teaching practices, were found to influence teachers' change. Finally, this study emphasizes the importance of the congruence between teacher education and the teaching context as well as the influence of school norms on teacher change.

Introduction

Rationale for the Study

Classroom management, as described by Evertson and Weinstein (2006), refers to “the actions teachers take to create an environment that supports and facilitates both academic and social-emotional learning. [. . .] It not only seeks to establish and sustain an orderly environment so students can engage in meaningful academic learning, it also aims to enhance students' social and moral growth” (p. 4). Classroom management has been shown to be a central issue for teachers, and particularly for beginning teachers, who report poorer classroom climates than experienced teachers (Jensen, Sandoval-Hernandez, Knoll, & Gonzales, 2012). It has been shown that novice teachers' picture of good teaching included being able to motivate students, which is one of the aims of classroom management (Weinstein, 1989). Classroom management is also considered a key competence for experienced teachers, as shown by the Teaching and Learning International Survey (OECD, 2009), which revealed a reported need for professional development in classroom management.

When studying classroom management, it is important to consider both the beliefs and the practices of teachers. Indeed, a substantial body of research suggests that beliefs are concomitant with practices (e.g., Buehl & Beck, 2015; V. Richardson, 1996, 2003; Tillema, 2000). On the one hand, research has conceptualized teacher beliefs as one of the main sources of teaching practices (Nespor, 1987; Pajares, 1992), as well as one of the main filters of teacher change (Hollingsworth, 1989; Holt-Reynolds, 1992; Mansfield & Volet, 2010;

McDiarmid, 1992). On the other hand, practices are also responsible for changes in beliefs (Buehl & Beck, 2015; Crahay, Wanlin, Issaieva, & Laduron, 2010; V. Richardson & Placier, 2001). Studies have shown that enacting new practices, even if one is not convinced by those practices, can progressively lead to a change in beliefs if the new strategies lead to good results with students (Arora, Kean, & Anthony, 2000; Baron, 2015). Thus, we decided to examine changes in classroom management beliefs and practices concomitantly, considering that the relationship between beliefs and practices is interactive and reciprocal.

Extensive research has been conducted regarding which practices encourage student engagement and how engagement occurs (Reeve, 2009; J. C. Turner, Christensen, Kackar-Cam, Trucano, & Fulmer, 2014). Research supports student-centred and constructivist practices. The self-determination theory presents evidence that teaching in a way that fulfils student needs for autonomy, competence and relatedness is beneficial for student engagement and motivation (Reeve, Deci, & Ryan, 2004). Related teacher education goals include helping teachers transform unexamined beliefs about teaching and learning into evidentiary beliefs, and encouraging them to adopt teaching practices that are favourable for student learning and engagement. Therefore, one of the sources of teacher change should be teacher education. However, despite the efforts of teacher education programs to promote such practices, teachers tend to keep using practices that are not in line with educational reforms and tend to perpetuate a more transmissive and traditional approach to teaching (V. Richardson, 2003). Changing teachers' beliefs seems to be a difficult, albeit possible, task. Some studies have shown that teacher education can impact beliefs about classroom management (e.g., Aelterman, Vansteenkiste, Van Keer, & Haerens, 2016; Akar & Yildirim, 2009). However, other studies and literature reviews indicate that those beliefs are resistant to change and that teacher education has limited impact on them (e.g., Chai, Teo, & Lee, 2009; McDiarmid, 1992). In this context, further studies are needed to explain why teachers adopt or discard those beliefs and practices and how the process of change in practices takes place.

The contradictions in the results of the studies about the effect of teacher education on classroom management may derive from the fact that teacher education is not the only factor effecting teacher change in classroom management. Thus, it is important to adopt a broader perspective, considering not only what happens during teacher education but also other teaching and learning experiences. Research has shown that experiences made in the schools in which teachers are employed also affect the development of classroom management beliefs and practices (Fives & Buehl, 2012; Mansfield & Volet, 2010; V. Richardson & Placier, 2001; Tschannen-Moran, Salloum, & Goddard, 2015). Teachers typically adapt their practices to the conditions and demands of their school context (Everitt, 2012). Indeed, many studies have concluded that a student-teaching experience in a school characterized by traditional practices and culture can lead teachers to adopt more traditional and transmissive beliefs and practices (Chai et al., 2009; Gawlitza & Perels, 2014; Mansfield & Volet, 2010; Putman, 2009).

Personal characteristics can also impact teachers' beliefs and practices. After years of teaching experience, teachers have usually developed a better understanding of classroom management, which enables them to adapt their classroom management practices accordingly (Morris-Rothschild & Brassard, 2006; Wolff, van den Bogert, Jarodzka, & Boshuizen, 2014). Moreover, studies have shown a tendency for novice teachers to hold traditional beliefs about teaching and learning (Borko & Putnam, 1996; Calderhead, 1996). Motivations for choosing teaching have also been shown to impact teachers' classroom management beliefs and practices.¹ The majority of the studies aimed at linking the factors that influence the choice to

¹ See Berger and colleagues (2017) for an analysis of the motivational antecedents of vocational teachers' classroom management, including the descriptions of the scales used for the present study.

teach to instructional practices have used the FIT-Choice theoretical framework (Watt & Richardson, 2007). Studies have shown that several motivations for choosing teaching, such as ability motivation (i.e., choosing the teaching profession because one thinks she or he has abilities to teach), social utility value (i.e., choosing the profession because one wants to impact youth and society), and intrinsic value (i.e., choosing teaching because one is interested in the activity of teaching), were linked to positive teaching practices. By contrast, motivations such as fallback career (i.e., choosing teaching because one has no other option), opportunity (i.e., being offered the opportunity to become a teacher), and personal utility value (i.e., choosing teaching because of the extrinsic benefits offered by the profession) were linked to negative teaching practices. Social utility value (i.e., choosing the profession because one wants to impact youth and society) and subject interest (i.e., choosing teaching because one is interested in the subject she or he teaches) were found to be related to the adoption of both positive and negative teaching practices (Berger, Girardet, & Aprea, 2013; Berger, Girardet, Vaudroz, & Aprea, 2017; P. Richardson & Watt, 2014). However, to our knowledge, the impact that motivations for choosing teaching have on the *evolution* of classroom management beliefs and practices has not yet been investigated.

Accordingly, the present mixed-methods study aims to investigate not only if and how teachers change, but why they change, taking into account the teacher education setting, the school setting, and the teacher's personal characteristics.

Classroom Management Practices and Beliefs Investigated in the Present Study

As a broad topic, classroom management has been investigated using very diverse lenses (Evertson & Weinstein, 2006). The perspective adopted in the present study is rooted in the self-determination theory (SDT) socio-cognitive framework, which emphasized four types of practices presented as two orthogonal continuums: autonomy support versus control, and structure versus chaos (Jang, Reeve, & Deci, 2010; Reeve, 2009; Reeve et al., 2004; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). Autonomy-supportive teachers listen to their students, encourage students to find answers by themselves, offer time for independent study, and accept students' expressions of negative emotions. They communicate empathically, provide encouragement rather than demands, and use methods that foster students' intrinsic motivation (Reeve, 2009). Controlling teachers favour extrinsic motivational resources, appear coercive, express judgments, provide students with answers, and silence expressions of negative emotions. Structure refers to the quantity and clarity of teachers' information about their expectations and about how students are thought to achieve desired outcomes (Skinner & Belmont, 1993). Structuring teachers give clear information, provide rationales and instructions for learning activities, and offer constructive feedback. A chaotic teaching environment is characterized by the teacher giving confusing and contradictory information and expressing expectations and objectives with a lack of clarity (Skinner, Marchand, Furrer, & Kindermann, 2008).

Classroom management practices are closely related to teachers' beliefs about student motivation. These beliefs can take multiple forms (Nolen & Nicholls, 1994; J. Turner, 2010) but fall into two broad categories: beliefs in using intrinsic forms of motivation (e.g., taking into account students' individual interests, asking for personal projects, or finding challenging tasks to engage students in learning) and beliefs in using extrinsic forms of motivation (e.g., rewards, punishments). Indeed, the more teachers believe in the utility of fostering intrinsic motivation, the more they support students' autonomy (Reeve, 2009). In contrast, the more teachers believe in the relevance of extrinsic forms of motivation, the more they try to control students.

Beyond beliefs about student motivation, more general beliefs about teaching and learning also play a role in teaching practices. Beliefs about teaching and learning differ among individuals: while some conceive of the teacher as the holder of knowledge whose purpose is to transmit it to students, others maintain that the teacher should favour students' active learning. In the literature (Chan & Elliott, 2004; Nie & Lau, 2010; Nie, Tan, Liao, Lau, & Chua, 2012; OECD, 2014), two general classes of beliefs are typically distinguished: "direct transmission" beliefs and "constructivist" beliefs. Beliefs in direct transmission are centred around the idea of the transmission of knowledge by the teacher to the students, the latter being passive recipients. The role of the teacher is to communicate knowledge in a clear and simple way, giving the correct answers to the students and ensuring that they are calm and focused. Constructivist beliefs focus not only on the knowledge to be acquired but also on the students, who are considered actors in the acquisition of knowledge. These beliefs are reflected in a vision of students as active participants in the process of learning and in an emphasis on the development of thought processes rather than the acquisition of specific knowledge. Constructivist beliefs have been shown to be related to student-oriented practices, and direct transmission beliefs to structuring practices (OECD, 2009).

Vocational Teacher Education in Switzerland

Vocational teachers in Switzerland usually enter vocational teacher education after a few years of teaching in a vocational school. Thus, vocational teachers already have teaching experience and established instructional practices and beliefs when they enter teacher education. Teacher education takes place in conjunction with a current teaching job in a vocational school and includes courses and teacher educators' visits to the vocational teachers' classrooms. Diverse programs are offered by the teacher education institute. Teachers of practical classes follow a program of 600 hours of training over one year. For teachers of theoretical classes, teacher education consists of a program of 1800 hours of training spread over two or three years. Teachers who already have more than five years of teaching experience have the possibility to validate their prior experience through a program consisting of a slimmed-down curriculum. All programs follow core curricula designed by the State Secretariat for Education, Research and Innovation. Among other directives, this framework asks teacher educators to encourage vocational teachers to support their students' autonomy and self-regulation (State Secretariat for Education Research and Innovation, 2011). Thus, teacher education institutions and teacher educators adhere to a socio-constructivist conception of teaching and learning, promoting autonomy support and structure in their classes. Teacher education includes instruction based on vocational teachers' experiences in their own classrooms and takes the form of lectures, group-work, and workshops. Both beliefs and practices are examined. Vocational teachers are encouraged to apply the practices presented during training sessions in their own classrooms and to reflect on their practices. Teacher educators also accompany teachers in their workplaces on several occasions, and they discuss teaching and work together to improve the teacher's practices. Finally, teachers write a dissertation that aims to link the content of their teacher education program with their own practices by reflecting on a specific situation they encountered, using both their practical experiences and educational theories.

Research Questions

Two studies were conducted to answer the following questions: (a) How do teachers' beliefs and practices evolve as a result of the inputs of a two-year vocational teacher education program? Do the changes match the beliefs and practices endorsed by the teacher education program? (b) How much variation in the growth rate is there between teachers? (c) What are the factors that encouraged or impeded teacher change?

Study 1 consisted of a longitudinal survey, and Study 2 of interviews. The following two sections present the methods and findings of the two studies.

Study 1

Method

Design and Participants

For the research project in which this study was embedded, teachers who began teacher education at the institute in autumn 2013 were surveyed. On top of those teachers, online surveys consisting of the same questions were conducted among practicing teachers who had already completed teacher education. While these practicing certified teachers were surveyed only once, teachers enrolled in the one year programs were surveyed both at the beginning of teacher education (T1; autumn 2013) and at the end of the program (T2; spring 2014).

The specific sample for the present study comprised teachers who completed the 1800 hours program. Participants were 71 vocational teachers in Switzerland, 42 men and 29 women. Their mean age was 39 years, and their ages ranged from 24 to 56. Prior to the beginning of the program, participants had from 0 to 19 years of teaching experience, with a mean of 2.4 years. They were surveyed at the onset of teacher education (T1; autumn 2013), at the end of the first year (T2; spring 2014) and at the end of the second year (T3; spring 2015) of teacher education. The survey was identical on the three separate occasions. While all participants who completed the survey at T1 and practicing teachers who had already completed teacher education were included to test the reliability and invariability of the scales, only the sample of 71 teachers who responded to the three measurement occasions was used for the longitudinal analyses.

The survey included measures of *self-reported classroom management practices* (autonomy support, control, structure, and chaos), *general pedagogical beliefs* (constructivist and direct transmission), and *beliefs about motivating students* (promoting intrinsic and extrinsic motivations). The instruments are described below. Surveys were administered during class time, with the presence of the teacher educator and a researcher. Participation was voluntary.

On each occasion, some participants were missing at random (i.e., some were exempted from a class based on their prior education and some were absent for reasons unrelated to the survey). Between 50 and 56 participants answered the survey on the three occasions. Participation was a function of attendance on the survey collection days and was unlikely to reflect unintended sample selectivity. Accordingly, answers from all participants were included for analysis.

Data Analyses

Confirmatory factor analyses (CFAs) assessed the validity and invariance of the scales across time points. In order to solve the problem of high kurtosis in a sample of 71 teachers,

we added more participants from a broader and less specific sample (total participants in this combined sample $N = 410$), following Fried, van Borkulo, Epskamp, Schoevers, and Tuerlinckx (2016). Indeed, in the specific sample consisting of 71 teachers, participants' answers were very consensual: many teachers gave the exact same scores, which led participants deviating from this consensus to be considered as outliers. A high kurtosis can create problems in the model fit, notably regarding the Standardized Root Mean Square Residual (SRMR). Adding different participants to the sample reduced the number of outliers by adding more diversity in the participants' answers, which solved the problem with the SRMR coefficient. The participants added to the sample of 71 teachers were certified vocational teachers, as well as teachers enrolled in the different teacher education programs of the institute (see section 1.3) who began teacher education in autumn 2013. Only T1 answers were taken into account to assess the scales invariance and validity. In a first step, we used listwise treatment of missing data to yield modification indices that informed decisions to allow the errors of some items with similar wording to covary ($N = 332-406$). Items that did not load significantly on their assigned factor were excluded. Next, loadings within the same factor were constrained to load equally, and the model fit of the constrained model was compared to that of the unconstrained model using the chi-square difference test for nested models. We concluded that average scores could be calculated validly for each factor, since the constrained model showed a model fit similar to that of the unconstrained model (i.e., χ^2 difference test was not significant).

Longitudinal analyses of the surveys were performed on the sample of 71 teachers using a multilevel approach, with occasions nested within participants to assess linear change across the three measurement occasions. Full information maximum likelihood estimation was used in order to include all of the observed data, based on the missing at random assumption. Because multilevel modelling does not require balanced data, it is not a problem if all measurements are not available for all participants (Heck & Thomas, 2015). Since in most cases we collected considerable information about individuals even if they did not answer all items, it was likely that there would be less bias in estimating the model's parameters if we retained individuals with partially complete data than if we excluded all the participants with missing data. Moreover, such an approach allows us to conduct analyses both between participants and within each participant's development over time, enabling us to assess whether and how classroom management tendencies changed within individuals over time but also to test for predictors of individual differences between participants (Murayama et al., in press).

We examined intra-class correlations (ICC) in a baseline variance component model (Model 0) to see which proportion of the variance can be explained by time-varying features (within-person variation), and which proportion by participant features (between-person variation). To answer the research questions, we then set up a series of multilevel models based on the variance component model. First, we computed a fixed-effect model (Model 1) to investigate if participants as a group changed on the variables of interest. This model assumes that the slope, or growth rate, is parallel for all participants. The second model (Model 2), incorporating fixed and random effects, allowed the slope to vary across individuals, which allowed us to investigate whether there were significant variations between participants regarding their growth rates and their initial values. Some of the random variance (i.e., variance associated with individual differences) may be attributed to fixed predictors other than time. Thus, individual characteristics (i.e., sex, motivations for choosing teaching and years of teaching experience) were added as predictors in a third model (Model 3), to test whether the individual differences in the random effect model (Model 2) could be explained by individual characteristics. All models were specified in Mplus 7.0 (Muthén & Muthén, 2012).

Instruments

Classroom management practices. Self-reported classroom management practices were assessed using six vignettes inspired by the Problems in School Questionnaire (Deci, Schwartz, Sheinman, & Ryan, 1981; Pelletier, Séguin-Lévesque, & Legault, 2002) and revised in one of our prior studies (Berger, Girardet, Vaudroz, & Crahay, submitted). Each vignette described a problematic situation and suggested four possible ways to react, each representing one of the four types of practices: autonomy support, control, structure and chaos (Reeve et al., 2004). Teachers had to rate each sentence on a seven-point Likert Scale (1 = does not apply to me at all; 7 = applies to me completely). For example, for a vignette describing the situation of a very passive class showing no enthusiasm and not answering questions asked by the teacher, teachers rated the extent to which they would use autonomy support (i.e., “Remind students of the relevance of the course and ask them about the reasons for their passivity”), control (i.e., “Impose surprise tests: in each course, a student, chosen randomly, will be tested. Thus, they will learn the material.”), structure (i.e., “Tell the students about your expectations regarding class participation and remind them of the importance of being active in learning”) and chaos (i.e., “Continue teaching in the same way; students will start being active when examinations get close”).

CFAs were performed for each scale with free loadings, and again with loadings constrained to equal each other. Regarding CFA, the fit for the model with the freely estimated loadings was good for each of the four scales (χ^2 p-value>.05, CFI>.95, TLI>.95, RMSEA<.05, SRMR<.05), and the model fit did not significantly worsen after loadings were constrained to equal each other. The chi-square difference test for MLR, after adjusting the χ^2 using the Satorra-Bentler scaling correction, was found to be not significant for the four scales (χ^2 between 3.14 and 6.22, all $p > 0.1$). Thus, we concluded that the scales could be used for the three measurement occasions.

Teachers’ beliefs about promoting students’ motivation. Twelve items were translated and adapted from scales developed by Nolen and Nicholls (1994), Shalter Bruening (2010), and Stipek, Givvin, Salmon, and MacGyvers (2001) and revised from our prior study (Berger et al., submitted). Six items assessed beliefs in the value of promoting intrinsic motivation (e.g., “Take into account students’ interest during class is useful to motivate them”), and six items assessed beliefs in the value of promoting extrinsic motivation (e.g., “To motivate students, it is useful to warn them that they will not succeed in their studies unless they study more”). Participants rated each item on a six-point Likert scale (1 = completely disagree; 6 = completely agree). The CFAs lead to the same conclusions as for classroom management practices: the scales could be used for the three measurement occasions.

General pedagogical beliefs. Twelve items were adapted from Chan and Elliott (2004) and from the French translation (Berger & D’Ascoli, 2012) of items from TALIS (Jensen et al., 2012). Six items assessed constructivist beliefs about teaching and learning (e.g., “A good teacher always encourages students to think about answers and solutions on their own”), and six items assessed direct transmission beliefs (e.g., “Frontal teaching is the most useful because it allows the teacher to present the most knowledge and information”). Participants rated each item on a six-point Likert scale (1 = completely disagree; 6 = completely agree). Again, the CFAs lead to the conclusion that the scales could be used for the three measurement occasions.

Findings: The Evolution of Teachers' Classroom Management Beliefs and Practices

First, we present the results related to mean growth rates (fixed effects). Second, we show moderators of growth at the individual level (i.e., sex, years of teaching experience and motivations for choosing teaching) (random effects). Table 1 presents all the results of the multilevel linear growth models. The results indicate that vocational teachers' beliefs and practices at the beginning of the program were already close to the beliefs and practices recommended by research and endorsed by the teacher education program. Indeed, they tended to favour autonomy-supportive and structuring practices and to report control and chaos less often. Their beliefs were mostly constructivist, and they believed more in the use of strategies to promote students' intrinsic motivation than in the use of strategies aimed at promoting students' extrinsic motivation.

The ICCs revealed that time-varying features (including random errors such as measurement errors) explained between 39.3% (control) and 78.0% (constructivism) of the variance in reported practices and beliefs.

Growth over Time at the Sample Level

Overall, vocational teachers' beliefs and practices evolved towards the beliefs and practices encouraged by the teacher education program. There was a growth in constructivist beliefs, and there was a drop in direct transmission beliefs, in beliefs in promoting extrinsic motivation, and in controlling practices. Changes happened mainly in the beliefs and practices considered detrimental (i.e., report of control, beliefs in direct transmission and beliefs in promoting extrinsic motivation), which decreased during the two years of the study. Finally, general pedagogical beliefs were the most likely to change, with the largest growth rate.

Moderators of Growth

Variance of the growth rate was significant for control, structure, beliefs in constructivism, and beliefs in promoting intrinsic motivation. Adding predictors to the multilevel analyses allowed us to identify years of teaching experience and motivations for choosing teaching as predictors of the variation in the evolution of control and structure among participants. Having more teaching experience significantly strengthened the decrease in control. We can hypothesize that the more experience a teacher has to reflect on, the more she or he will be able to link that experience with the inputs of teacher education. Thus, teaching experience can allow teachers to benefit more from teacher education. Having more teaching experience also significantly limited the increase in structure. This result was, at first, surprising. However, the multilevel model indicated that years of teaching experience also moderated the initial mean of structure: teachers with more teaching experience reported higher structure at T1 than teachers with less experience. We could conjecture that structure is a practice that develops with experience. Thus, as teachers with more teaching experience reported higher levels of structure at the beginning of the teacher education program, they benefited less from the program than teachers who had fewer years of experience. Two motivations for choosing teaching were also found to moderate teachers' evolutions. Intrinsic value strengthened the decrease in control, and personal utility value limited the increase in structuring practices during teacher education. Thus, choosing the teaching profession because one is intrinsically interested in the activity of teaching seems to be a facilitator of change, while choosing the teaching profession because one is attracted by its extrinsic .

			Fixed effects			Random effects							
			Mean initial status	Mean growth rate		Variance of growth rate		Experience on growth rate		Intrinsic value on growth rate		Personal utility on growth rate	
Variables	Model	ICC	Est. (SE)	Est. (SE)	P-value	Est. (SE)	P-value	Est. (SE)	P-value	Est. (SE)	P-value	Est. (SE)	P-value
<i>Reported classroom management practices (Likert scale: 1 = does not apply to me at all; 7 = applies to me completely)</i>													
Autonomy support	0	.516	5.442 (.087)										
	1		5.458 (.106)	-0.016 (.069)	.811								
	2		5.447 (.109)	-0.004 (.072)	.951	0.069 (.063)	.272						
Control	0	.607	2.730 (.113)										
	1		2.906 (.142)	-0.181 (.073)	.013								
	2		2.892 (.140)	-0.165 (.072)	.023	0.105 (.053)	.048						
	3		2.552 (.665)	-0.796 (.232)	.001	0.076 (.049)	.119	0.060 (.025)	.016	0.089 (.040)	.028		
Structure	0	.421	5.073 (.087)										
	1		5.173 (.114)	-0.105 (.073)	.150								
	2		5.163 (.115)	-0.089 (.075)	.235	0.115 (.058)	.048						
	3		4.843 (.316)	0.427 (.223)	.056	0.093 (.055)	.090	-0.038 (.018)	.034			-0.132 (.062)	.033
Chaos	0	.587	2.450 (.094)										
	1		2.482 (.103)	-0.032 (.056)	.562								
	2		2.482 (.103)	-0.036 (.055)	.514	0.009 (.049)	.847						

<i>General pedagogical beliefs (Likert scale: 1 = completely disagree; 6 = completely agree)</i>							
<i>Constructivism</i>	0	.220	4.996 (.059)				
	1		4.800 (.082)	0.202 (.060)	.001		
	2		4.801 (.082)	0.211 (.058)	<.001	0.097 (.040)	.016 ¹
<i>Direct transmission</i>	0	.594	3.123 (.083)				
	1		3.349 (.101)	-0.234 (.048)	<.001		
	2		3.346 (.101)	-0.230 (.047)	<.001	0.034 (.040)	.391
<i>Beliefs about promoting student motivation (Likert scale: 1 = completely disagree; 6 = completely agree)</i>							
<i>Intrinsic motivation</i>	0	.411	5.020 (.047)				
	1		5.019 (.063)	0.001 (.043)	.982		
	2		5.012 (.063)	0.010 (.043)	.815	0.042 (.019)	.027 ¹
<i>Extrinsic motivation</i>	0	.595	2.845 (.091)				
	1		3.002 (.110)	-0.162 (.058)	.005		
	2		2.994 (.108)	-0.153(.055)	.005	0.055 (.048)	.251

Table 1: Results of multilevel growth model

¹Model 3 was not included in the table because no predictors of the variance of the growth rate were identified.

benefits seems to be an obstacle to adaptive change. Sex was not found to predict any differences in growth rates.

None of the predictors moderated the slopes for the evolution of beliefs in constructivism or in the promotion of intrinsic motivations,² despite the indication in the significant variance of the growth rate that vocational teachers did not all change in a similar way. This suggests that factors not considered in this study could act as moderators of teacher change. The following section may provide answers about other factors influencing the evolution of classroom management beliefs and practices.

Study 2

Method

Design and Participants

Seventeen participants who were selected from the pool of survey respondents agreed to take part in semi-structured interviews revolving around the evolution of their classroom management beliefs and practices since the beginning of their teaching experience. Interviews took place in spring 2015. Audio of the interviews was recorded. Throughout each interview, the participant reflected on her or his present and past practices for dealing with specific classroom situations experienced (i.e., a situation of student passivity and a situation of student disturbance), and on the factors that influenced the evolution (or lack of evolution) of her or his practices regarding those situations. Demographics for each of the 17 interview participants are presented in Table 2.

Pseudonym	Sex	Age	Subject taught	Type of school	Teaching experience
Juliette	F	29	Management, administration	Professional school	4
Marie	F	49	Media	Commercial school	2
Aurélie	F	45	Media	Professional school	4
Nicole	F	39	Social and educational work	PET college	4
Victor	M	32	Sciences	Transitional and integrative school	2
Brigitte	F	35	Arts	Professional school	7
Vincent	M	44	Management, administration	Professional school	2
Cédric	M	55	Industry	Transitional and integrative school	2
Stéphanie	F	34	Health	Professional school	2
Damien	M	58	LCS	Transitional and integrative school	3
Albert	M	42	Informatics	Professional school	6
Laurent	M	35	Industry	PET college	2
Thomas	M	52	Agriculture	Professional school	3
Antoine	M	29	Industry	Professional school	3
Mathieu	M	39	Industry	Professional school	3
Louise	F	28	LCS	Professional school	4
Alice	F	26	Management, administration	Professional school	3

Table 2: Description of the participants

LCS = Instruction in language, communication and society.

PET = Professional education and training; that is, tertiary vocational education and training.

² Note that these variables had the lowest ICC (respectively, .220 and .411), which means that the changes in those variables were mostly due to time-varying features.

Data Analyses

Interview data analysis followed an iterative process of content analysis and coding development (both inductive and deductive), using inputs from the literature on the impact of teacher education on the evolution of teaching practices and beliefs. The coding of classroom management practices was primarily based on the model of Reeve et al. (2004). The coding of the factors influencing teacher change was mostly inductive. A single researcher coded all the transcripts. A coding test was completed with a pilot interview study with a similar sample and similar themes and goals, resulting in good inter-rater reliability (Girardet & Berger, 2017).

Findings: Triggers of Teacher Change

Triggers of teacher change were observed in the contexts of both the teacher education program and the schools in which teachers were employed. They were separated in two subsections accordingly.

The Influence of the Teacher Education Context

Important persons: teacher educators and peers. Interview participants often talked about influential people in the context of the teacher education program. First, the opportunity to discuss teaching with peers during teacher education seemed beneficial to teachers. Nicole's words reflect an opinion held by many of the teachers interviewed: "It's the opportunity to consult with other teachers who have the same problems. Here we are able to exchange ideas, especially in several modules that are really very interactive. So we can consult with other teachers, see what they are doing, what works, what doesn't." The conclusion that sharing and collaboration with peers are highly valued by teachers and pre-service teachers is not uncommon (e.g., Arora et al., 2000; Hail, Hurst, & Camp, 2011; Rainer & Guyton, 2001). The self-determination theory (Reeve et al., 2004) proposes that in order to offer optimal conditions for learning, one must have needs for three basic elements fulfilled: autonomy, competence and relatedness. Robinson Beachboard, Beachboard, Li, and Adkison (2011) suggest that collaboration fulfils the need for relatedness, which can facilitate teacher change.

Teacher educators are also mentioned as influential people. Several teachers mention the names of teacher educators who have had influence on the evolution of their classroom management beliefs and practices, such as a pedagogy expert who made an intervention or a teacher educator who came into the teacher's classroom with great goodwill. This suggests that behaviours can be learned through the influence, whether deliberate or inadvertent, of examples or models (Bandura, 1971).

Providing teachers with alternative strategies to try in their classrooms. Teacher education helped teachers change when it provided them with alternative teaching practices. In the interview responses, teachers typically mention the modules that presented classroom management strategies that they found useful. During the program, teachers had to implement new strategies in their classrooms and hosted advisory visits by teacher educators in their workplaces. They also had the opportunity to have one lesson recorded and could reflect on their practices with the help of the video. Juliette acknowledges the importance of testing the strategies in her classroom because it allowed her to see which strategies worked and which did not work. She also noticed that this exercise made her focus more and more on the students rather than on the act of teaching. Indeed, trying out new strategies can be useful even if the teacher is not convinced by the strategies. Antoine, for example, needed to implement a strategy several times before he was convinced that it was indeed useful. This

finding aligns with the work of Arora et al. (2000) and Baron (2015), whose participants took the risk of implementing innovative practices presented during a professional development program. The authors concluded that even if a teacher does not believe in the effectiveness of innovative practices at first, positive classroom experiences with such practices can lead to a change in beliefs about the strategies. This finding suggests that providing opportunities for teachers to try out innovative practices is a way of pushing them out of their comfort zones and can trigger change in beliefs and practices. Moreover, it suggests that beliefs are not necessarily precursors of practices, but that the two elements can have reciprocal influences.

Questioning and reflecting on teaching practices. The teacher education program helped teachers question their current practices. Many of the teachers interviewed mention that teacher education provoked realizations, sudden moments of awareness of their teaching, and the ability to take some distance to think about their teaching and analyse their practices. Laurent, for example, explains his realization following the recording of one of his class: “I was able to see a lot of things about me and about the way I structured my class. And I realized that it was not okay at all!” Research has shown that reflection on practices is important for teacher change in classroom management beliefs and practices. For example, Piwovar, Thiel, and Ophardt (2013) showed that lectures, microteaching, and reflection on action created more teacher change than lectures alone. “Postactive reflection,” as it was termed by Calderhead (1996), should include concerns about the effectiveness of practices, about their effects on students (e.g., Is this particular practice appropriate for students on a moral level?), and about the purposes of education and the assumptions that underlie practice. Different degrees of reflection can thus improve the quality of teacher learning (Calderhead, 1996).

The Influence of the Teaching Context

Teaching experience. The teachers in this study seem to believe that they learned a lot through practice. For Stéphanie, “practice makes perfect.” Vincent talks about repetition. This type of learning seems to have a short perspective: the teacher changes only in reaction to something that happens in the classroom. For example, Aurélie explains that she observes students for hints or feedback that show her that she needed to change something in her teaching strategies.

Juliette and Thomas explain that teaching experience allows one to look back at one’s teaching and to see what works and what does not, which allows one to revise teaching practices. This suggests that some degree of reflection on experience is needed in order to trigger realizations. Learning from teaching experience is more successful if the experience is embedded in the teacher education program.

Important persons in the workplace. Influential people in the workplace were mentioned as facilitators of teacher change as well as obstacles. The case of Brigitte was particularly representative of how a person can act as an obstacle to teacher change. When Brigitte started to teach in a professional school, she soon faced problems with a co-worker. This co-worker was very controlling and was the one to decide everything in the school, from the curriculum to the class material. This other teacher imposed her way of teaching on Brigitte, who did not dare to contradict her. Brigitte’s change only resulted after the departure of this colleague. She had to work hard to get out of the methodologies that her former colleague imposed and to build her own personality as a teacher. But beginning at that moment, Brigitte was able to implement new practices in her classroom, though she still had to learn to defend her ideas in front of other colleagues.

Thankfully, colleagues can also facilitate teachers’ adaptive change. When asked what triggered her change towards less transmissive methods, Louise explains that she changed

because she talked with her colleagues: “They explained to me that I should not use too much frontal teaching. Then I realized that it [frontal teaching] was indeed not working, so I asked [my colleagues] about exercises and so on.” Indeed, support and help from colleagues is often mentioned as a facilitator of change. Albert explains that each time he faced a problem in his classroom, he could discuss it with his colleagues, who shared some of the strategies they had used to solve the same problem. Albert adds that he sought help from colleagues whose vision of teaching he knew to be similar: “I will not go to a colleague who, I don’t know, gives pure frontal teaching and talks, talks and gives information, because it’s not what I want to experience. So instead I will approach colleagues who I know give dynamic lessons, and who I know are appreciated by their students.”

The influence of colleagues on the practices a teacher is using in her or his classroom can be positive or negative. Thus, an influential person in a teacher’s workplace can be either an obstacle or a facilitator to teachers’ adaptive change.

School norms. When transmissive teaching is the norm of a school, this can be very problematic for novice teachers. The case of Alice is rather demonstrative. Alice worked in a large vocational school that she describes as “industrial.” The organization of the school works in such a way that teachers are interchangeable and can pick up any class. The school gives teachers the program, the material, the exercises and the corrections of the exercises, such that any teacher can come and teach any subject. This strategy leaves almost no space for teacher autonomy. When Alice entered the teacher education program, she was highly interested in innovative pedagogies. She felt that her beliefs about pedagogy were more and more distant from the norms of her school, which created internal discomfort. Alice tried to talk about her pedagogical discoveries with her colleagues, but her colleagues made fun of her and judged her classroom practices: “Why are you creating courses? Why are you using role plays and such things in your class? That’s not what is asked from you. You have the program, you have the exercises, you have the corrections, you have your class. That’s it.” The attitudes of Alice’s colleagues extended even to the point that she felt intentionally ignored by groups of colleagues when she greeted them. She also suspected that some colleagues purposely deleted some of the files on her computer. She did have some colleagues she could turn to and whom she trusted, but in general she did not feel accepted in her school because of her beliefs and practices.

In the teacher education classes, and with the positive feedback she had received from teacher educators and mentors during lesson visits, Alice found her teaching style and built confidence in her teaching. The norms of the school prevented her from truly being the teacher she wanted to be, but they did not prevent her from keeping her strong beliefs in innovative pedagogical methods. She is very conscious of her situation, which represents an ethical dilemma for her: “I don’t want to become a teacher who uses warning, warning, tick, tick, tick, two hours of detention, tick, tick, tick, two more hours. But I know that I won’t be able to change either this institution or my colleagues.” As a result, Alice thinks that she will apply for work in another institution whose norms are closer to her own.

In the case of Alice, school norms did not influence her strong adaptive beliefs. They did influence her practices, however, since she did not feel free to implement innovative practices in her classrooms. School norms can have a dramatic impact on teachers if they are unsure about their beliefs or if they tend to believe in transmissive teaching methods. Indeed, in a school with traditional values and co-workers, beginning teachers’ desires to fit in can represent obstacles to change towards adaptive beliefs and practices. Like Alice, Antoine also worked in a large professional school. In his description of teacher reaction to a disruptive student in his classroom, Antoine consistently uses the pronoun “we”. For example, he says: “We got him out of the classroom, we wrote remarks [. . .]. So, we couldn’t deal with him very well, in fact. The only way to deal with him was to get him out of the classroom.” When asked about his use of the pronoun “we”, Antoine explains that he meant to refer to him and

his colleagues: “We have a team, which works well, and when we have problems, well, we can share them with colleagues.” Thus, Antoine seems to have embraced the practices and beliefs of his colleagues in the school. In his case, the norms of the school acted as an obstacle to change.

School norms not only entail common practices of other teachers in a school but also institutional constraints. Nicole suffered from how the school in which she was employed functioned. She explains that the school did not allow enough time for course preparation. As a result, she feels that she did not have the time to prepare her classes or imagine classroom activities. Her school even blamed her for working more than she was supposed to and taking more time than what was allowed.

Required curricula were also felt by teachers to be an obstacle. For Laurent, teaching practices depended on the curriculum that had to be followed and the time teachers had to achieve it. Antoine says that a good teacher had to closely follow the curriculum. One of his fears was falling behind the required schedule. Thus, he felt required to use frontal teaching most of the time and to leave little space for experimenting with constructivist practices, because he believed that constructivist practices were time-consuming and would result in his not being able to cover the curriculum.

Discussion and Conclusion

Congruence between the Teacher Education and School Contexts

This study shows that in-service teacher education has lessened the beliefs and pedagogical strategies that are considered detrimental to students’ engagement. Moreover, it reveals that teacher education has had a greater influence on beliefs than on reported practices. We can infer from these results that teacher education succeeds in calling into question teachers’ prior beliefs about teaching and learning. Indeed, there is evidence that beliefs need to be questioned before change can happen. If beliefs are not strongly entrenched in a teacher’s mind, it can become fertile ground for new beliefs (Mansfield & Volet, 2010). On top of helping teachers question their prior beliefs and practices, teacher education provides teachers with alternative practices and prompts them to implement them in their classrooms, a situation that was identified as a facilitator of change by the interview participants. As Woolfolk Hoy, Davis, and Pape (2006) have stated, “Teachers change their beliefs as they are made explicit, as they begin to doubt these beliefs, and as they are exposed to powerful alternative conceptions” (p. 728). In this study, these three factors alone do not seem to have resulted in a real shift towards adaptive practices, since only control decreased over time. However, this combination can be a solid foundation for teacher change, as our findings suggest that teachers’ beliefs were positively influenced by the program.

In this study, teachers highly valued the inputs of influential people around them either in the teacher education context or the workplace. Sharing experiences and collaborating seem to have been important facilitators of teacher change. This finding corroborates the results of studies that concluded that a collaborative learning environment is beneficial for teacher learning (Arora et al., 2000; Rainer & Guyton, 2001).

If collaboration in the teacher education context, where everyone shares constructivist beliefs, can only bring adaptive changes, collaboration with colleagues in the workplace can also lead to maladaptive changes, especially when the school and colleagues share traditional values and practices. In this study, some teachers mentioned collaboration with their colleagues as a facilitator for the implementation of transmissive practices, or as a justification for not having implemented more constructivist practices in their classrooms. Thus, in view of these constant references to co-workers as an important source of factors facilitating or impeding change, it seems that a certain level of congruence between the

teacher education and the school contexts might be necessary in order to implement innovative practices in teachers' classrooms. As Mansfield and Volet (2010) have explained, the more congruent an experience is across contexts, the more it encourages change.

Furthermore, the fact that teachers tend to value experience in the workplace more than the inputs of teacher education courses (Brouwer & Korthagen, 2005; Tabachnick & Zeichner, 1984) adds to the conclusion that the school context needs to share the values of teacher educators in order to successfully influence teacher change.

The Influence of School Norms on Teacher Change

This study has emphasized the impact of school norms on teacher change. If schools impose curricula and goals that have to be reached by all students at a specific moment, behaviour management directives telling teachers how to react to misbehaviour, or achievement tests that all students in a school have to pass, a lack of teacher autonomy can result. If teachers feel constrained to stick to more traditional practices, this can lead to a lack of change or maladaptive change. By contrast, if teachers are autonomous and feel free to innovate in the classroom, without pressure to cover a specific curriculum or to meet school deadlines, they are more likely to be willing to experiment with innovative practices. Other studies have shown that school directives, such as achievement testing, can impact teacher change (Arora et al., 2000; Cady, Meier, & Lubinski, 2006; Swan & Swain, 2010). Arora et al. (2000) observed that when the school system conveys a sense of urgency and pressures teachers to be systematic and efficient, this leads teachers to favour traditional methods with orderly classrooms and transmissive teaching methods. Thus, perceived pressure from senior management to prepare students for achievement tests or to cover specific curricula can hinder the implementation of innovative practices by some teachers (Swan & Swain, 2010). In other words, more controlling teaching environments might lead to more controlling classroom practices. Moreover, as human beings have a tendency to align their beliefs and practices with those shared by the group they belong to (Leicester, 2016), it is likely that traditional school environments where most co-workers believe in transmissive pedagogies lead teachers to embrace beliefs and practices valued by the school without questioning them. Along the same lines, Martin (2004) showed that placement with a difficult supervisor who holds traditional beliefs can result in unsuccessful change in beliefs and practices.

Limitations

The present study cannot ascertain whether the changes inferred from the survey are due only to teacher education or rule out the effect of other influences. Given the setting in which the study took place, multiple factors might have influenced self-reported practices and interview responses. If we consider that the teaching context affects teachers' practices, we can argue that there is a limit to surveying the teachers at different times of the school year. In this study, T2 and T3 were measured at the end of the school year, but T1 was measured at the beginning of the school year. At the beginning of the school year, teachers typically have classes full of new students and have to spend time establishing rules and procedures. Having their new classes in mind while answering the questionnaire could have led to higher reporting of structuring strategies, for example. Furthermore, teachers might have had different classes to teach on the different survey occasions, which could have also influenced their survey responses. Considering that, at the sample level, scores on the scales reflected highly adaptive beliefs and practices even at the beginning of the teacher education program, we cannot exclude a possible regression towards the mean effect in the presented results. Finally, a limitation is that classroom management practices were reported by the teachers.

The survey assessed what teachers think they are doing or would be doing if they were confronted to a certain classroom situation rather than what they actually do in their classrooms. Therefore, we have to keep in mind that the results of our studies could have been different if practices were observed or if students' perceptions of their teachers' practices were assessed.

Implications

In this study, teacher education helped teachers evolve towards adaptive classroom management beliefs and practices. Our findings suggest that teacher education triggers a reflection on beliefs that leads teachers to lessen their use of controlling practices. This finding implies that professional development can be fruitful and that teachers may need follow-up experiences after their initial teacher education programs if they are to avoid going back to their prior beliefs and practices (V. Richardson & Placier, 2001) and evolve towards more autonomy-supportive and structuring practices. Furthermore, a strong message from the analyses is that teachers' school culture and peers should be more explicitly integrated into this professional development.

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