European Journal of Developmental Psychology

ISSN: 1740-5629 (Print) 1740-5610 (Online) Journal homepage: http://www.tandfonline.com/loi/pedp20

Fostering pupils' lifelong learning competencies in the classroom: evaluation of a training programme using a multivariate multilevel growth curve approach

Marko Lüftenegger, Monika Finsterwald, Julia Klug, Evelyn Bergsmann, Rens van de Schoot, Barbara Schober & Petra Wagner

To cite this article: Marko Lüftenegger, Monika Finsterwald, Julia Klug, Evelyn Bergsmann, Rens van de Schoot, Barbara Schober & Petra Wagner (2015): Fostering pupils' lifelong learning competencies in the classroom: evaluation of a training programme using a multivariate multilevel growth curve approach, European Journal of Developmental Psychology, DOI: 10.1080/17405629.2015.1077113

To link to this article: http://dx.doi.org/10.1080/17405629.2015.1077113

Published online: 17 Sep 2015.

Submit your article to this journal

Article views: 29

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
http://www.tandfonline.com/action/journalInformation?journalCode=pedp20

Download by: [University Library Utrecht] **Date:** 27 January 2016, At: 03:14

EUROPEAN JOURNAL OF DEVELOPMENTAL PSYCHOLOGY, 2015
http://dx.doi.org/10.1080/17405629.2015.1077113

Routledge
Taylor & Francis Group

Fostering pupils' lifelong learning competencies in the classroom: evaluation of a training programme using a multivariate multilevel growth curve approach

Marko Lüftenegger[a], Monika Finsterwald[a], Julia Klug[a], Evelyn Bergsmann[a], Rens van de Schoot[b], Barbara Schober[a] and Petra Wagner[c]

[a]Faculty of Psychology, Department of Applied Psychology: Work, Education, Economy, University of Vienna, Wien, Austria; [b]Department of Methodology and Statistics, Utrecht University, Utrecht, The Netherlands; [c]Upper Austria University of Applied Sciences, Linz, Austria

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

ABSTRACT
Evidence-based interventions to promote lifelong learning are needed not only in continuing education but also in schools, which lay important cornerstones for lifelong learning. The present article reports evaluation results about the effectiveness of one such training programme (TALK). TALK aims to systematically implement the enhancement of lifelong learning in secondary schools by optimizing teaching in terms of developing pupils' competencies for lifelong learning. TALK is conducted within the framework of a three-semester course of studies for secondary school teachers. In order to evaluate the effectiveness of TALK, a questionnaire study with 1144 pupils was conducted in the form of a pretest–posttest–posttest design for both training and control groups. Multivariate multilevel growth curve analyses showed the benefit of TALK in terms of both pupils' perceptions of classroom instructions and their individual motivation. Finally, TALK's contribution to promote lifelong learning in schools is discussed and implications are given.

ARTICLE HISTORY Received 25 March 2015 Accepted 23 July 2015

KEYWORDS Lifelong learning; motivation; self-regulated learning; teacher education programme; evidence-based; self-efficacy

Introduction

Lifelong learning has been seen as an important socio-political concern since the 1970s. Since then, there has been a shift in policy from lifelong learning as a means of personal development and social progress (Faure et al., 1972) to

CONTACT Marko Lüftenegger marko.lueftenegger@univie.ac.at
Marko Lüftenegger, Faculty of Psychology, Department of Applied Psychology: Work, Education, Economy, University of Vienna, Universitätsstraße 7, Wien 1010, Austria

© 2015 Taylor & Francis

lifelong learning as an economic necessity (OECD, 1997). The process of personal development (known as "Bildung" in German or "formation" in French) consists of continuous learning and takes place across the lifespan. This development is an existential phenomenon because the knowledge, skills, attitudes and beliefs we have learned must be continually re-invented or renewed in novel situations. Besides personal development, the economic rationale for lifelong learning focuses on the necessity of being able to handle constant change and transition as a result of rapid technological and scientific changes, organizational innovation, and global competition (Field, 2012). This capacity to deal with the increasing insecurity of economic life requires the lifelong development of skills and knowledge. In our rapidly changing (Western) society, both rationales are crucial for the development of the individual.

As permanent learning is indispensable, the question arises as to what can be done to ensure successful lifelong learning. In our approach, lifelong learning is defined as the competence for learning throughout one's lifetime, a domain-specific competence that requires motivation and self-regulated learning (SRL) (Klug, Krause, Schober, Finsterwald, & Spiel, 2014).

Even though lifelong learning is often seen as primarily a topic for further education, school is considered by both researchers and politicians to lay the cornerstones for preparing pupils for lifelong learning (Gorard, 2009; OECD, 1997). However, "educational systems and practices in many countries are obviously poorly prepared, and often ineffective, concerning the development of lifelong learning competencies in schools" (Schober, Luftenegger, Wagner, Finsterwald, & Spiel, 2013, p. 116). This concerns both the motivational beliefs of pupils, which decrease the longer they stay in school (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006), as well as of teachers, who feel inadequately prepared to foster pupils' lifelong learning competencies (Hardré & Sullivan, 2008).

The Austrian Federal Ministry for Education, Arts and Culture tasked the Department of Applied Psychology of the University of Vienna (Austria) with developing, conducting and evaluating a teacher education programme for secondary teachers in the context of continuing education that enables them to promote core competencies for lifelong learning among their pupils within their regular teaching (this programme is called TALK[1]).

A sound literature review had shown that there are no evaluated programmes for teachers that explicitly deal with lifelong learning. Related programmes on motivation or self-regulated learning (=SRL; the two core determinants of lifelong learning) have rarely been implemented in regular classrooms, were usually restricted to an individual subject area (mostly math or reading/writing) and often focus only on single aspects of motivation (e.g., interest) or SRL (e.g., learning strategies; for an overview, see Schober et al., 2013). Hence, we developed

1. Training programme to foster teacher competencies to encourage lifelong learning—translation of the German title: Trainingsprogramm zum Aufbau von LehrerInnenkompetenzen zur Förderung von Lebenslangem Lernen.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

and implemented a training programme to foster lifelong learning (Schober, Finsterwald, Wagner, Lüftenegger, Aysner, & Spiel, 2007) which follows standards for evidence and transfer to practice (e.g., Flay et al., 2005).

In this article, we evaluate whether the already proven gain in teacher competencies (Finsterwald, Wagner, Schober, Lüftenegger, & Spiel, 2013) through the TALK programme also led to corresponding, perceptual changes in teaching and pupils' competencies for lifelong learning.

Background of the teacher education programme TALK

Theoretical foundation of the content

Lifelong learning is, in its original form, a matter of social policy. Within educational and psychological science, two core determinants of lifelong learning independent of specific contextual features are discussed (Schober et al., 2007): (1) an enduring motivation and appreciation for learning and education and (2) those competencies that are needed to successfully realize this motivation through concrete learning activities. We assume an interactive effect of both determinants: To achieve a high lifelong learning competence, both motivation and self-regulated learning have to be high. If either motivation or SRL was low, high values on the other determinants are of little or no consequence for lifelong learning and behaviour. That is to say, individuals will successfully master the demands of lifelong learning when they see learning and the acquisition of knowledge as valuable and attractive (high *motivation*) and have the skills associated with SRL. Both are considered as modifiable by training, experience and reflection, for example.

Research on these two core determinants of lifelong learning is manifold and interconnected. Determinants can be identified that can be found in both research areas, especially when considering literature on how to foster them: Schunk and Zimmerman (2008), for example, presented how the complex construct of motivation is related to the complex construct of SRL and list different sources of motivation that can play a role in self-regulation (e.g., interest, goal orientation, self-efficacy, outcome expectations). Concerning motivation, TALK mainly focused on the expectancy–value theory (Wigfield & Eccles, 2000): According to this theory, pupils start to learn if they believe that they can be successful in performing a task (= expectancy), and if they consider the task to be important (= value). An example for an expectancy construct is self-efficacy (Bandura, 1997) and interest (Krapp, 2002) is considered a "value" construct.

Although reports of practical field applications and programmes in schools exist for fostering motivation and SRL (for an overview see Schober et al., 2013), not many have been tested in real classroom settings or focus, for example, on more than one aspect of motivation. However, empirical evidence from meta-analyses (Dignath & Büttner, 2008; Hattie, Biggs, & Purdie, 1996) showed

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

medium to strong mean effect sizes of SRL intervention programmes on pupils outcomes (e.g., achievement, learning behaviour, motivation, emotions). Within the field of motivation enhancement (especially fostering interest), teaching according to the principles of self-determination theory (SDT; Ryan & Deci, 2000) is often recommended, particularly because of its practical utility (Niemiec & Ryan, 2009). This theory specifies three basic needs: autonomy, competence and relatedness. A multitude of empirical education studies exist about SDT, most emphasizing personal and contextual factors that facilitate optimal learning, engagement and well-being (see Guay, Ratelle, & Chanal, 2008). It has been shown that the degree of autonomy provided is associated with greater pupil engagement, enhanced intrinsic motivation/interest, higher self-esteem/perceived competence and a higher quality of learning (Guay et al., 2008). From a perspective of SDT (Deci & Ryan, 1985), autonomous behaviour constitutes self-regulation. Therefore, the relevance of providing autonomy is found very often in practical recommendations or teacher programmes within the context of motivation enhancement, like the TARGET framework[2] (Epstein, 1988; Lüftenegger, van de Schoot, Schober, Finsterwald, & Spiel, 2014).

But being supportive of autonomy does not imply that one should provide choices without any structure and supervision. Receiving information and adequate feedback about the learning progress as well as about successes and failures is important for both regulating one's own learning and motivation (Hattie & Timperley, 2007). Pupils should experience that it is normal to make errors; mistakes are allowed in the classroom and are important for the learning process and future learning since they help to establish accurate mental models (e.g., Hattie & Timperley, 2007; Steuer, Rosentritt-Brunn, & Dresel, 2013). Beyond this, feedback is relevant when considering pupils' basic need for perceived competence that is closely tied to the concept of self-efficacy. When studying the SRL literature about recommendations for classrooms, a large variety of different theoretical conceptions of SRL can be found. Our understanding of SRL is rooted in a social cognitive perspective in which some basic assumptions about the nature of SRL are common in most models (see e.g., Zimmerman & Moylan, 2009): (1) a set of skills or abilities are necessary for SRL as well as adaptive attitudes and beliefs that can be taught and learned by almost everyone. (2) The models stress the importance of setting goals or having performance standards/criteria. (3) Learners are active constructive participants in the learning process. (4) Self-regulated activities mediate between personal and contextual characteristics and the learning outcome. (5) SRL is seen as situation specific.

Although self-regulation in learning is inherent and ubiquitous (Winne, 2005), productive SRL does not take place automatically but SRL can be learned and improved in appropriate learning environments. Research about the conditions

2. The TARGET framework consists of six instructional strategies or dimensions (Task, Authority, Recognition, Grouping arrangements, Evaluation practices, Time allocation) with which a mastery goal orientation can be fostered in classrooms. These six instructional dimensions are assumed to overlap and interact.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

that facilitate SRL showed, for example, that teachers can support pupils' SRL by providing differentiated help with generating goals and plans, self-monitoring and evaluating progress (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). A positive feedback culture is also needed to calibrate one's learning (Hattie & Timperley, 2007). Formulating clear expectations is another important issue (Sierens et al., 2009).

Structure of the teacher training programme

TALK was conceptualized for secondary school teachers who would participate in the training programme as school teams. It was delivered as a course of studies in a university setting and lasted three semesters. It embraces a total of 130 h (blocked into one or two-day workshops) and took place ten times in the first semester, six times during the second semester and four times in the third semester.

In the first two semesters ("intensive phase"), the focus was on encouraging teachers to reflect and optimize their classroom instruction in accordance with the session contents. The sessions explicitly covered the topic of lifelong learning as well as target variables from the fields of motivation and SRL (see Table 1 for an overview of the topics). The teachers learned about scientific results and how to transfer them into their daily classroom teaching and their schools.

Table 1. Overview of the topics addressed in the TALK sessions during the intensive phase.

Topics	Subtopics
Lifelong learning (LLL)	
	• Introduction to concept/reflection • Teachers plan LLL projects for their pupils and present the results of these projects
Motivation	
	• Motivation: introduction (action process model of motivation) • Learning motivation • Interest • Feedback (including self-worth, attribution theory, frame of references)
Self-regulated learning (SRL)	
	• SRL: introduction (process models; learning competences) & possibilities for promotion • Self-awareness: teachers plan their own SRL projects & work on them
Social competencies	
	• Cooperative learning • Conflict resolution (including violence prevention)
Cognitive competencies	
	• Critical thinking • Creative thinking (including problem solving)
School as an organization/project management	
	• School as a learning organization (incl. systemic view of organizations; importance of teacher cooperation) • Project management (how to implement projects in schools successfully)

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

In the third semester ("supervision phase"), the focus turned to ensuring sustainability: teachers planed and initiated projects within their classes directly tied to TALK. Correspondence between project plan and the principles of TALK was ensured, and teachers were supervised across all phases of the implementation of their projects (for more information about curriculum, structure and didactic principles of TALK see Schober et al., 2007).

Aims of the current evaluation

In this article, evaluation results of TALK, a pilot programme in the form of a three-semester teacher education programme for teachers in the context of lifelong learning, are presented. The effectiveness of TALK on teachers` competencies in fostering lifelong learning (= proximal goals) has already been shown (see Finsterwald et al., 2013). However, evidence of the transfer effect in daily classroom teaching is still lacking. More concretely, it was of interest to investigate whether this competence gain also led to (1) corresponding, perceptual changes in teaching and in (2) their pupils' competencies for lifelong learning.

The aim of this evaluation is to investigate whether these distal goals of TALK were reached.

Regarding the first goal, we assume that participating in TALK would lead to perceivable changes in teachers' classroom practice in comparison with classrooms of teachers who did not attend the programme. Concretely, we expect training effects concerning perceptions of the classroom that are considered useful in fostering motivation and SRL, namely reports of more autonomy, a good climate in handling failure and more opportunities for pupils to acquire competencies to manage all phases of SRL, in comparison with the control group.

Furthermore, we suppose that participating in TALK would have an impact on pupils' development of lifelong learning competencies. Concretely, the development of pupils' interest and self-efficacy and their competencies to manage all phases of SRL are expected to be affected. With respect to all goals formulated for the evaluation, it is assumed that the developments assessed for the classrooms and pupils in the training group would be more positive than those found in a corresponding control group. Figure 1 shows a graphical representation of the different goal levels.

Method

Design

In order to evaluate the summative effectiveness of TALK, surveys were conducted within the framework of a training and control group comparison (a pretest–posttest 1 [end of intensive phase]–posttest 2 [end of supervision phase] design). The control groups consisted of matched samples of teachers and pupils who did not participate in any intervention.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

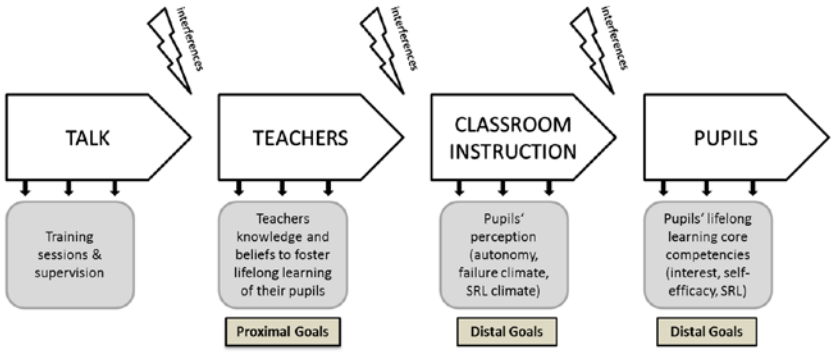

Figure 1. Goal levels, possible interferences during transfer and expected effects of the TALK programme.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Sample

In order to participate in the TALK programme, school principals of secondary schools in Vienna and Lower Austria were required to submit applications naming a team of teacher participants. In sum, 45 teachers from 14 Austrian secondary schools were admitted to TALK (two to five teachers per school); 40 teachers completed the training programme. At the start of the programme, each teacher chose one class where the content of the programme was tested and implemented.

The pupils completed questionnaires at the beginning of the school year (also the beginning of the TALK training programme; pretest), at the end of this school year (also the end the intensive phase; posttest 1), and nine months later, in the middle of the following school year (end of the supervision phase; posttest 2).

In recruiting the control group, an announcement calling for participation in a longitudinal study on lifelong learning was sent to secondary schools. A total of 13 principals expressed their interest in having their schools participate. In order to obtain an equivalent control group, a matching procedure was used as proposed by Spiel et al. (2008). Statistical matching is assumed to mimic the comparison of individuals in a randomized experiment (Rubin, 1977). Generally, in these cases, propensity score matching is applied, a method which has been shown to provide unbiased estimates of the average training effect (D'Agostino, 2005). Spiel et al. (2008) propose a procedure that allows one to perform matching based on multiple raw covariate scores. First, the variables which are to be matched were selected on a theoretical basis. *School grade*, *perceived autonomy in classroom*, *perceived promotion of self-regulation in classroom*, *self-efficacy* and *learning competencies* were chosen as matching variables. Then, using these variables, Euclidean distances were calculated for the pre-test data. Finally, matches were identified (for each training class a matched control

class was established according to the defined matching variables). To clarify whether group equivalence was attained, a multivariate variance analysis with all dependent variables at the first measuring point was calculated which did not detect any significant differences between the training and control groups.

In sum, the sample for the evaluation of the training programme TALK consisted of 1144 pupils (514 in the control group) attending 58 classes in 27 secondary schools. 52.1% of the pupils were female. The pupils were enrolled in Grades 5 (37.6%), 6 (24%) and 7 (38.4%) and were between 10 and 13 years old at the first measurement point. The average number of children per classroom was 19.72 (SD = 7.51).

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Measures

Data were collected with paper-and-pencil questionnaires at all three measuring points (pre-test, post-test 1, post-test 2). All of the items were developed in the context of the TALK project (Schober et al., 2007), and validity could already be shown for a subsample in an empirical study about lifelong learning (Lüftenegger et al., 2012) (for an overview see Table 2). Internal consistencies of scales (Cronbach's α) were found to range from satisfactory to good for all constructs and all three measurement points.

Analytical approach

Multivariate multilevel growth curve analysis was used to analyse the data. Growth curve modelling allows researchers to analyse the differences among individuals in their growth over time. Two growth parameters are used to characterize these individual paths: (1) an initial level growth parameter (= intercept) and (2) a linear growth rate parameter (= slope). Both these parameters are viewed as factors and vary between subjects.

In this study, the growth curve approach was applied for both the three classroom perception outcomes together (Models 1a, 2a, 3a; Research Question 1) and the three pupil outcomes together (Models 1b, 2b, 3b; Research Question 2). The advantage of this multivariate approach is that it also allows one to estimate the association between the growth trajectories of all three outcome variables for both research questions. Additionally, a multilevel approach was used to account for the nested structure of our data where individuals (pupils) are nested into groups (classes). This multilevel approach allowed us to model not only differences between pupils but also differences between classes in the growth trajectories of the investigated variables. For this study, a three-level analysis in terms of time (first level), individual (second level), and class (third level) was conducted.

The analyses were conducted in three steps, using Mplus 6.1 (Muthén & Muthén, 1998–2010). First, we analysed Model 1 with three latent growth curve models separately for each of the three outcome variables, considering

Table 2. Measures.

Variable	*n**	Reliability**	Sample item	Description
Interest in instruction	3	.72/.70/.74	In this class, I am learning something that I think is important	Value and emotional valence were considered (Krapp, 2002)
Self-efficacy	3	.70/.73/.80	When I make the effort, I can solve even the more difficult problems in class	The items focused on efficacy expectations among pupils (Bandura, 1997)
SRL competencies	6	.77/.80/.83	After studying in this class, I think about whether I have made proper use of the time I had	The items were based on existing instruments (Perels, Gürtler & Schmitz, 2005; Pintrich & de Groot, 1990)
Perceived autonomy	7	.63/.72/.77	In this class, we make important decisions with the teacher	The aspects autonomy while learning in school and joint social responsibility in the classroom were included
SRL climate	7	.75/.79/.81	In this class, we are asked to assess our own learning success	The extent to which pupils experience the encouragement of SRL in the classroom was assessed
Failure climate	1		In this class, it is not a big deal when someone makes a mistake	

Notes: All of the items were rated on a six-point scale ranging from "absolutely false" (1) to "absolutely true" (6). A higher score indicated a higher expression of the quality in question.*Number of items.**Cronbach´s α for three measurement points.

the multilevel structure (Model 1). Second, we analysed the outcome variables simultaneously (Model 2—unconditional model). In a final step, the time-invariant variable group (0 = control group; 1 = training group) was added at the class level as predictor of the growth parameters of the outcome variables to test whether there are training effects (Model 3—conditional model). For the sake of clarity, only estimates of the final model, Model 3, are provided. Goodness of fit of the models was evaluated using common fit indices.

The rate of individuals omitting items (nonresponse) in this study was below 5% (for all items) and, as such, very small. The imputation of the missing values was accomplished with the NORM programme (Schafer & Graham, 2002) using full information maximum likelihood estimation, whereby all variables were drawn on in the generation of estimations.

Results

Perception of changes in classroom

Table 3 provides descriptive statistics for all perceived class and pupil outcomes at the three measurement points.

In order to investigate the first research question, that is, whether pupils' perceptions of classroom instruction change in the TALK classes, three growth curve models were conducted. The results of the model selection procedure are presented in Table 4.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Table 3. Descriptive statistics for all perceived class and pupil outcomes at the three measurement points.

		Training group				Control group			
Item	Wave	*M*	SD	Min	Max	*M*	SD	Min	Max
Perceived class outcomes									
Autonomy	1	3.72	0.81	1.57	5.86	3.60	0.76	1.86	5.57
	2	3.59	0.84	1.00	5.86	3.42	0.84	1.00	5.71
	3	3.51	0.92	1.00	6.00	3.34	0.89	1.00	6.00
Failure climate	1	5.02	1.28	1.00	6.00	5.03	1.25	1.00	6.00
	2	4.92	1.29	1.00	6.00	4.76	1.30	1.00	6.00
	3	4.82	1.30	1.00	6.00	4.58	1.45	1.00	6.00
SRL climate	1	4.16	0.92	1.00	6.00	4.07	0.84	1.00	6.00
	2	4.01	0.93	1.00	6.00	3.73	0.95	1.00	6.00
	3	4.00	0.97	1.00	6.00	3.64	0.92	1.14	6.00
Pupils outcomes									
Interest	1	4.15	1.11	1.00	6.00	4.08	1.11	1.00	6.00
	2	3.77	1.14	1.00	6.00	3.60	1.23	1.00	6.00
	3	3.54	1.22	1.00	6.00	3.37	1.30	1.00	6.00
Self-efficacy	1	4.94	0.82	1.00	6.00	5.02	0.79	1.00	6.00
	2	4.93	0.89	1.00	6.00	4.83	0.93	1.00	6.00
	3	4.84	0.93	1.00	6.00	4.75	0.96	1.00	6.00
SRL competencies	1	4.09	1.00	1.00	6.00	4.09	1.02	1.00	6.00
	2	4.01	1.11	1.00	6.00	3.99	1.11	1.00	6.00
	3	3.90	1.15	1.00	6.00	3.81	1.07	1.00	6.00

Model 3a, the multivariate multilevel growth curve model with group as predictor, had the lowest AIC and BIC value, indicating that this model offers the best trade-off between model fit (likelihood of the data) and complexity (number of parameters). Furthermore, an evaluation of model fit indices indicated that Model 3a demonstrates a good fit.

Results, see Table 5, showed significant means of intercepts and slopes of failure climate, autonomy and SRL climate. Significant within-level variance and between-level variance of the intercept mean of failure climate, autonomy, and SRL climate indicated that pupils and classes differed in their baseline levels in terms of classroom perception. Significant within-level variance and between-level variance of slope means of failure climate autonomy, and SRL climate indicated that pupils and classes changed in their autonomy, failure climate and SRL climate over time.

The intercepts for failure climate, autonomy and SRL climate were not significantly predicted by group indicating that there were no differences in the initial status of these variables between the training group and the control group. Therefore, no pre-test differences can be assumed. There was a significant slope of failure climate and SRL climate indicating a training effect in classroom perception. Declines in the perception of a positive failure climate and climate

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Table 4. Model fit indices and model comparison for perceived class and pupil outcome variables.

Models	χ^2 (N = 388)	d*f*	CFI	TLI	RMSEA	SRMR-W	SRMR-B	AIC	BIC
Class outcome variables									
1a Outcomes separate & multilevel	1342.69*	78	.43	.47	.119	.183	.408	27940.22	27979.41
2a Outcomes simultaneously & multilevel	276.92*	66	.90	.90	.053	.031	.407	26909.54	26971.12
3a Conditional training effect	228.86*	66	.93	.91	.046	.032	.181	26866.00	26945.37
Pupil outcome variables									
1b Outcomes separate & multilevel	1440.22*	78	.57	.60	.124	.226	.477	27869.14	27908.02
2b Outcomes simultaneously & multilevel	162.28*	66	.97	.97	.036	.032	.474	26669.77	26731.35
3b Conditional training effect	131.91*	66	.98	.98	.032	.031	.131	26649.17	26727.54

Notes: CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root-mean-square error of approximation; SRMR-W = Standardized-Root-Mean-Square-Residual Within-Level; SRMR-B = Standardized-Root-Mean-Square-Residual Between-Level; Conventional guidelines were followed whereby fit is considered adequate if the CFI and TLI values are >.90, the RMSEA is <.08, and the SRMR is <.08; AIC = Akaike information criterion; BIC = Bayesian information criterion (sample size adjusted); Models with lower information criterion values indicate a better model fit.*p < .001.

fostering SRL were less strong in the training group. No associations between group and autonomy were found (Table 5).

Changes in pupils' development of lifelong learning competencies

In order to investigate the second research question, that is, whether pupils' interest, self-efficacy and SRL competencies changed in the TALK classes, three growth curve models were conducted. The results of the model selection procedure are presented in Table 4.

Model 3b, the multivariate multilevel growth curve model with group as predictor, had the lowest AIC and BIC value. Furthermore, an evaluation of model fit indices indicated that Model 3b demonstrates a good fit. Results, see Table 5, showed significant means of slope and intercept of interest self-efficacy, and SRL.

Significant within-level variance and between-level variance of intercept means of interest self-efficacy and SRL indicated that pupils and classes differed in their baseline levels of interest, self-efficacy and SRL. Significant within-level variance and between-level variance around the slope means of interest and self-efficacy indicated that pupils and classes changed in their interest and self-efficacy over time. SRL slope mean variance was only significant on the within-level.

The intercepts for interest, self-efficacy and SRL were not significantly predicted by group, indicating that there were no differences in the initial status of these variables between the training group and the control group. Therefore, no pre-test differences can be assumed. There was a significant slope for self-efficacy, indicating a training effect. The decline of self-efficacy was less strong in the training group. Non-significant, although positive, associations of both interest and SRL with group were found.

Discussion

Given the fact that schools and teachers are poorly prepared and often ineffective in preparing pupils for lifelong learning, there is a need for high quality intervention programmes to better equip teachers to face this. However, to our knowledge, no systematically evaluated teacher programme dealing with the promotion of lifelong learning competencies exists (Schober et al., 2013). Therefore, we developed, conducted and evaluated a theoretically grounded teacher training programme called TALK that aimed to foster lifelong learning competencies in schools and lasted 18 months. Having already been able to show the effectiveness of TALK on changing teachers` competencies in fostering lifelong (see Finsterwald et al., 2013), we aimed to examine also the more distal goals of changes in (1) pupils' perceptions of their classroom and (2) their

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Table 5. Multivariate multilevel growth curve models with training as a time-invariant covariate (Model 3a & Model 3b).

	Model 3a—Perceived Class outcomes						*Model 3b—Pupils outcomes*					
	Autonomy		Failure climate		SRL climate		Interest		Self-efficacy		SRL competencies	
	b	*p*	*b*	*p*	*b*	*p*	*b*	*p*	*b*	*p*	*b*	*p*
Means												
Intercept	3.61	<.001	5.02	<.001	4.05	<.001	4.04	<.001	5.00	<.001	4.10	<.001
Slope	−0.13	.001	−0.23	<.001	−0.21	<.001	−0.34	<.001	−0.14	.021	−0.14	<.001
Training on intercept	0.12	.102	−0.01	.943	0.11	.169	0.13	.293	−0.03	.588	0.01	.901
Training on slope	0.03	.275	0.13	.034	0.13	.002	0.04	.255	0.08	.017	0.05	.099
Variances												
Individual level (Pupils)												
Intercept	0.18	<.001	0.19	<.001	0.26	<.001	0.47	<.001	0.23	<.001	0.49	<.001
Slope	0.02	<.001	0.06	.023	0.02	.001	0.06	<.001	0.05	<.001	0.04	<.001
Class level												
Intercept	0.05	<.001	0.05	.003	0.06	<.001	0.16	<.001	0.02	.005	0.04	.009
Slope	0.01	.011	0.02	.003	0.01	.011	0.02	.006	0.01	.036	0.00	.830

Note: *b* = unstandardized regression coefficient.

lifelong learning competencies. On the whole, the results indicate that TALK is effective in fostering lifelong learning competencies in schools on several levels.

Turning to the training results, we found effects for pupils' perceptions of their classroom instruction. The assumption was that teachers' competence gains should result in changes in their teaching—alterations that pupils could actually perceive. Compared to pupils in control classes, pupils perceived both a more positive failure climate (important especially for fostering motivation) and a classroom climate more supportive of SRL (important for pupils' SRL competencies).

Although pupils in the training group perceived that their classroom provided more opportunities to acquire competencies to manage SRL in comparison with the control group, pupils from both groups did not differ in their self-reported decrease in competencies to manage SRL. One possible explanation for this could be that although pupils in training classes experienced a more supportive SRL climate, it will take more time for them to (successfully) apply their SRL in the classroom ("sleeper effect"). However, also concerning lifelong learning competencies, we found that pupils' self-efficacy beliefs did not decrease in the training group. Self-efficacy beliefs are not only crucial for pupils' motivation, and they also matter in all phases of SRL. Pupils high in self-efficacy are more likely to apply self-regulatory strategies than pupils low in self-efficacy (Pintrich & De Groot, 1990). Thus, even if TALK pupils did not apply SRL more successfully in class in comparison with the control pupils, they at least kept their self-efficacy beliefs that empower them to act as self-regulated learners. These results concerning self-efficacy are in accordance with previous results (Steuer et al., 2013) on the positive association of failure climate and academic self-concept (an expectancy belief and a construct very similar to self-efficacy).

Against our expectations, we found no effects for the perception of more autonomy by pupils in training classes. Consequently, we could also not find higher levels of interest and SRL competencies among pupils in the training classes. These results are in accordance to previous results of SDT research (Deci, Eghrari, Patrick, & Leone, 1994), as the degree of autonomy provided in classroom is associated with pupils' interest and SRL competencies.

The transfer of knowledge, beliefs or competencies gained in a teacher training to actual changes in pupils' competencies is by far not a trivial issue. There are a couple of sources of interference imaginable that could have accounted for TALK's failure to reach all of its distal goals. One possible explanation could be the possible mediating effect of the heterogeneous classroom projects: TALK teachers themselves developed projects for their class with a special focus on addressing points relevant to the situation in their schools. Certainly, this flexibility in accounting for individual differences between schools is a strength, especially in terms of teacher commitment and in fostering teachers' competencies. On the other hand, it is more difficult to secure training effects with such heterogeneous class projects in comparison with intervention programmes with

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

direct transfer of more standardized projects into the classroom. Of course, further studies are needed to fully understand the mechanisms and preconditions of the transfer of knowledge both from trainers to teachers and from teachers to pupils.

Limitations of the present evaluation

Two limitations of this evaluation study should be noted. First, the schools involved in the evaluation either as intervention or control schools volunteered to do so. Therefore, with regard to external validity, the programme effects can be generalized to schools and teachers that are willing to take part in the programme.

Second, the fit index SRMR-B for Model 3a und Model 3b is only mediocre. However, practices associated with model evaluation of complex multilevel modelling using SRMR are problematic due to the lack of empirical research (Hsu, 2009). Monte Carlo simulations show that SRMR-B is sensitive for complex models and shows only reasonable statistical power in models with high ICC (Hsu, 2009). Nevertheless, all the other descriptive measures of model fit (CFI, TLI, RMSEA, SRMR-W) indices clearly indicate a good model fit (Browne & Cudeck, 1993) for Model 3a and Model 3b. Additionally, the descriptive measures of model parsimony (BIC, AIC) for both models clearly show that we found the best trade-off between model fit and model complexity.

Implications

These findings are relevant both for educational policies and for evidence-based interventions in the field of (teacher) education. In the last 15 years, many calls have gone out for education and psychology to follow other fields (like medicine and agriculture) in placing more reliance on evidence as a basis for the adoption of programmes and practices (Spiel, 2009). Standards for evidence and transfer to practice have been extensively defined (e.g., Flay et al., 2005), but the broad-based implementation of an evidence base in education research and practice has not been achieved yet, and evidence-based reform has not yet been established in the federal policies of most European nations (Spiel, 2009). However, the work of teachers in the classroom should no longer be driven and perpetuated by subjective criteria but rather by scientific knowledge based on evidence on what works.

The evaluation of the theoretically grounded intervention programme TALK is a good example of considering standards of evidence (see Flay et al., 2005) while testing for effectiveness. TALK was evaluated in real-world conditions and considered methodically important features such as proper sample size, matched control design, multi-informant and multi-method outcome assessment

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

(see Schober et al., 2013), psychometrically sound measures, nested data structure and missing data imputation.

Acknowledgement

This research was supported by grants from the Austrian Federal Ministry for Education, Arts and Culture (bm:ukk). Rens van de Schoot served as an advisor on this project and assisted with the data analyses in Mplus.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Lüftenegger Marko http://orcid.org/0000-0001-8112-976X
Klug Julia http://orcid.org/0000-0002-6595-4505
van de Schoot Rens http://orcid.org/0000-0001-7736-2091

References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

D'Agostino, Jr., R. B. (2005). Propensity score. In B. S. Everitt & D. C. Howell (Eds.), *Encyclopedia of statistics in behavioural science* (pp. 1617–1619). Chichester: Wiley.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The Self-determination theory perspective. *Journal of Personality, 62*, 119–142. doi:10.1111/j.1467-6494.1994.tb00797.x

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning, 3*, 231–264. doi:10.1007/s11409-008-9029-x

Epstein, J. L. (1988). Effective schools or effective students: Dealing with diversity. In R. Haskins & D. MacRae (Eds.), *Policies for America's public schools: Teacher, equity and indicators* (pp. 89–126). Norwood, NJ: Ablex.

Faure, E., Herrera, F., Kaddoura, A.-R., Lopes, H., Petrovsky, A., Rahnema, M., & Ward, F. C. (1972). *Learning to be. The world of education today and tomorrow*. Paris: UNESCO.

Field, J. (2012). Transitions in lifelong learning: Public issues, private troubles, liminal identities. *Studies for the Learning Society, 2*, 4–11. doi:10.2478/v10240-012-0001-6

Finsterwald, M., Wagner, P., Schober, B., Lüftenegger, M., & Spiel, C. (2013). Fostering lifelong learning – Evaluation of a teacher education program for professional teachers. *Teaching and Teacher Education, 29*, 144–155. doi:10.1016/j.tate.2012.08.009

Flay, B. R., Biglan, A., Boruch, R. F., Castro, F. G., Gottfredson, D., Kellam, S., … Ji, P. (2005). Standards of evidence: Criteria for efficacy, effectiveness and dissemination. *Prevention Science, 6*, 151–175. doi:10.1007/s11121-005-5553-y

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Gorard, S. (2009). The potential lifelong impact of schooling. In P. Jarvis (Ed.), *The Routledge International Handbook of Lifelong Learning* (pp. 91–101). New York, NY: Routledge.

Guay, F., Ratelle, C. F., & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology/Psychologie canadienne, 49*, 233–240. doi:10.1037/a0012758

Hardré, P. L., & Sullivan, D. W. (2008). Teacher perceptions and individual differences: How they influence rural teachers' motivating strategies. *Teaching and Teacher Education, 24*, 2059–2075. doi:10.1016/j.tate.2008.04.007

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: A meta-analysis. *Review of Educational Research, 66*, 99–136. doi:10.2307/1170605

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research, 77*, 81–112. doi:10.3102/003465430298487

Hsu, H.-Y. (2009). *Testing the effectiveness of various commonly used fit indices for detecting misspecifications in multilevel structural equation models* (doctoral dissertation). Texas A&M University. Retrieved from http://hdl.handle.net/1969.1/ETD-TAMU-2009-12-7411

Klug, J., Krause, N., Schober, B., Finsterwald, M., & Spiel, C. (2014). How do teachers promote their students' lifelong learning in class? Development and first application of the LLL Interview. *Teaching and Teacher Education, 37*, 119–129. doi:10.1016/j.tate.2013.09.004

Krapp, A. (2002). Structural and dynamic aspects of interest development: Theoretical considerations from an ontogenetic perspective. *Learning and Instruction, 12*, 383–409. doi:10.1016/S0959-4752(01)00011-1

Lüftenegger, M., Schober, B., van de Schoot, R., Wagner, P., Finsterwald, M., & Spiel, C. (2012). Lifelong learning as a goal – Do autonomy and self-regulation in school result in well prepared pupils? *Learning and Instruction, 22*, 27–36. doi:10.1016/j.learninstruc.2011.06.001

Lüftenegger, M., van de Schoot, R., Schober, B., Finsterwald, M., & Spiel, C. (2014). Promotion of students' mastery goal orientations: Does TARGET work? *Educational Psychology, 34*, 451–469. doi:10.1080/01443410.2013.814189

Muthén, B. O., & Muthén, L. K. (1998–2010). *Mplus* (Version 6). Los Angeles, CA: Muthén & Muthén.

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom applying self-determination theory to educational practice. *Theory and Research in Education, 7*, 133–144. doi:10.1177/1477878509104318

OECD. (1997). *Lifelong learning for all*. Paris: Author.

Perels, F., Gürtler, T., & Schmitz, B. (2005). Training of self-regulatory and problem-solving competence. *Learning and Instruction, 15*, 123–139. doi:10.1016/j.learninstruc.2005.04.010

Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*, 33–40. doi:10.1037/0022-0663.82.1.33

Rubin, D. (1977). Assignment to a treatment group on the basis of a covariate. *Journal of Educational Statistics, 2*(1), 1–26.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78. doi:10.1037/0003-066X.55.1.68

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*, 147–177. doi:10.1037/1082-989X.7.2.147

Schober, B., Finsterwald, M., Wagner, P., Lüftenegger, M., Aysner, M., & Spiel, C. (2007). TALK – A training program to encourage lifelong learning in school. *Journal of Psychology, 215*, 183–193. doi:10.1027/0044-3409.215.3.183

Downloaded by [University Library Utrecht] at 03:14 27 January 2016

Schober, B., Lüftenegger, M., Wagner, P., Finsterwald, M., & Spiel, C. (2013). Facilitating lifelong learning in school-age learners: Programs and recommendations. *European Psychologist 2013, 18*, 114–125. doi:10.1027/1016-9040/a000129

Schunk, D. H., & Zimmerman, B. J. (Eds.). (2008). *Motivation and self-regulated learning. Theory, research and applications*. New York, NY: Routledge.

Sierens, E., Vansteenkiste, M., Goossens, L., Soenens, B., & Dochy, F. (2009). The synergistic relationship of perceived autonomy support and structure in the prediction of self-regulated learning. *British Journal of Educational Psychology, 79*, 57–68. doi:10.1348/000709908X304398

Spiel, C. (2009). Evidence-based practice: A challenge for European developmental psychology. *European Journal of Developmental Psychology, 6*, 11–33. doi:10.1080/17405620802485888

Spiel, C., Lapka, D., Gradinger, P., Zodlhofer, E. M., Reimann, R., Schober, B., … von Eye, A. (2008). A euclidean distance-based matching procedure for nonrandomized comparison studies. *European Psychologist, 13*, 180–187. doi:10.1027/1016-9040.13.3.180

Steuer, G., Rosentritt-Brunn, G., & Dresel, M. (2013). Dealing with errors in mathematics classrooms: Structure and relevance of perceived error climate. *Contemporary Educational Psychology, 38*, 196–210. doi:10.1016/j.cedpsych.2013.03.002

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68–81. doi:10.1006/ceps.1999.1015

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R. W., & Davis-Kean, P. (2006). Development of achievement motivation. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology*. Chichester: John Wiley & Sons.

Winne, P. (2005). A perspective on state-of-the-art research on self-regulated learning. *Instructional Science, 33*, 559–565. doi:10.1007/s11251-005-1280-9

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York, NY: Routledge.

Downloaded by [University Library Utrecht] at 03:14 27 January 2016