

## SHAPING IMPLEMENTATION SUCCESS: THE INFLUENCE OF PRINCIPALS' AND TEACHERS' ATTITUDES

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### ABSTRACT

This study intends to apply the Stages of Concern framework to methodically examine how principals and teachers react to creative ideas that are offered to them. This study also investigated the role these worry profiles play in the implementation process, as well as the individual factors that predicted these worry profiles. In order to accomplish this goal, we connected the participant acceptance and dissemination of the innovation (N = 66) and student outcomes (N = 539) with the profiles of the concerns. Although the principals' and instructors' profiles differed, it was discovered that they were both trustworthy markers of the students' success in the planned implementation process.

### I. INTRODUCTION

Since the Programme for International Student Assessment (PISA) started in 2000, and the finding that German students' performance was much lower than expected (OECD [The Organisation for Economic Cooperation & Development], 2001), politicians and school administrations in Germany have been aiming to improve the school system and teacher education programs in general, as well as the way in which lessons are given. Thus, the professional development of teachers is an important component in improving education and changing the classroom practices of teachers as well as the learning outcomes of students (Guskey, 2002). In the context of their professional development, the relevant persons — in the case of schools, teachers as well as principals in their role as teachers but also as supervisors — are confronted with new strategies, programs, or practices, which can be summarized under the term *innovation* (George, Hall, & Stiegelbauer, 2008). When challenged with such an innovation, the teaching staff first and foremost perceives it and reacts in an affective and cognitive way — resulting, for example, in openness and acceptance or refusal and denial regarding the innovation. One of the rare opportunities to capture this composition of the perceptions, attitudes, and reactions of participants in such a change process is provided by the model of the *Stages of Concern* (George et al., 2008; Hall & Hord, 2020). After the principals and teachers are confronted with an innovation during their professional development, they need to incorporate it into their daily routine of giving lessons in order to implement it in the long term and, ultimately, to affect students'

learning outcomes (Bitan-Friedlander, Dreyfus, & Milgrom, 2004; Guskey, 2002). Accordingly, two important questions in implementation research regard (1) the factors that foster the positive perceptions, attitudes, and reactions of the participants regarding the innovation (Stages of Concern), and (2) the extent to which individual concerns foster or inhibit the implementation process.

In line with psychological research on personality, which examines variations between individuals or between groups (Reuchlin & Bacher, 1966), this study aimed to examine whether groups of participants could be identified that deal to differing degrees, in terms of concerns, with an innovation in an implementation process — using the example of implementing methods to diagnose and promote students in reading. According to Bitan-Friedlander et al. (2004), who already presented different types of “teachers in training”, and in line with a rising number of studies using profile analyses (Böse, Neumann, Becker, Maaz, & Baumert, 2019; Böse, Neumann, Becker, Maaz, & Baumert, 2018; George et al., 2008; Pant, Vock, Pöhlmann, & Köller, 2008; Pant, Vock, Pöhlmann, & Köller, 2008), the underlying idea of person-centered approaches seems to be valuable in this research area. Therefore, we first aimed to explore which groups of participants (concern profiles) could be identified in a sample of elementary school principals and teachers in Germany ( $N = 66$ ) according to how they perceive the innovation and react in an affective and cognitive way. Second, taking the idea of divergent profiles (e.g., Bitan-Friedlander et al., 2004) into account, we aimed to identify the individual predictors of profile affiliation such as, for example,

(*communication*) *skills* and *motivation* to give reading lessons. Third, because most of the existing results of profile analyses in this field are linked only with qualitative data such as interviews (e.g., Bitan-Friedlander et al., 2004) or are directly linked with student data (e.g., Pant et al., 2008b), we analyzed the extent to which the profile affiliation predicted the adoption and diffusion of the innovation as well as the students’ learning outcomes — in this case their reading achievement — in the implementation process.

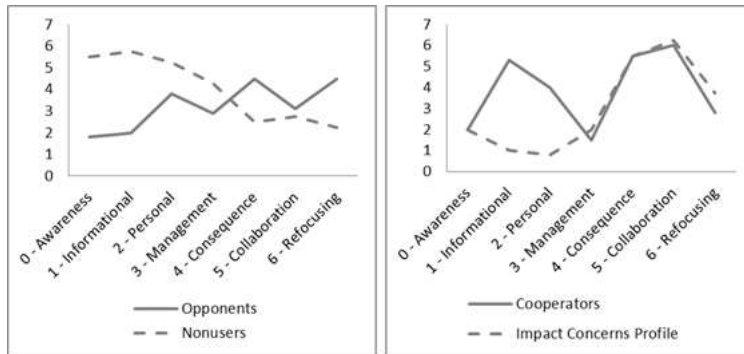
### *1.1. The Stages of Concern*

Hall and Hord (2020) identified and confirmed, in their widely known model, seven stages of concern about an innovation in an implementation process, by using a comprehensive definition of the term *concern* as “the composite

representation of the feelings, preoccupation, thought, and consideration given to a particular issue or task” (Hall & Hord, 2020, p. 106). The seven stages are shown in Table 1 in more detail.

Both authors initially assumed that the process of progressing through the different Stages of Concerns was similar to a developmental process: participants were expected to develop in the first year by progressing from Self-Concerns to Task Concerns and, ideally, after three to five years, to Impact Concerns. However, empirical research in this field did not confirm this theoretical assumption. Therefore, when drawing conclusions, the methods used (cross-sectional vs. longitudinal) and the time of measurement in the implementation process must be kept in mind (Bailey & Palsha, 1992; Watzke, 2007). Moreover, research has brought up a critical debate about the underlying framework of Hall and Hord, describing stages such as development as well as the missing linkage with existing theories such as the learning theory (see Anderson, 1997; Kwok, 2014). Despite this justifiable criticism of the model, it is still often used in implementation research concerning schools (Anderson, 1997; Bailey & Palsha, 1992; George et al., 2008; Pant et al., 2008a, 2008b; Shotsberger & Crawford, 1996; see Watzke, 2007), because it provides one of the rare opportunities to examine the individual perspectives of teachers in an implementation process in a model-based and standardized way (Conway & Clark, 2003; Pant et al., 2008b). Taking especially the criticism of the stepwise development into account, implementation research has increasingly tried to assess participants’ concerns in a more integrated way by distinguishing and interpreting different profile types.

For the profile interpretation, the peak scores, that is, the first and second highest scores, and the profiles are observed (Profile Interpretation; George et al., 2008). In this way, different profile types have been confirmed, for example, the Opponents and Nonusers as well as the Cooperators and Impact Concerns Profile (Fig. 1; Bitan-Friedlander et al., 2004; Böse et al., 2018, 2019; George et al., 2008; Hall & Hord, 2020; Pant et al., 2008a, 2008b). The Opponents have a low score on Stage 1 and a high score on Stage 2 and a big difference between the low scores on Stages 5 and 6. In particular, the tail up indicates that the participants have other ideas about the innovation or ideas that would completely replace the innovation (Bitan-Friedlander et al., 2004; George et al., 2008). The typical profile of the Nonusers is indicated by peaks in Stages 0, 1, and 2 — with lowest concerns in Stages 4, 5, and 6



**Fig. 1.** Profiles of Opponents and Nonusers as well as Cooperators and Impact Concerns Profiles adapted from Bitan-Friedlander et al. (2004); George et al. (2008), and Hall and Hord (2020).

(George et al. 2008; Fig. 1). Individuals with this kind of profile are more concerned about other things (Stage 0) even if they seem to be interested in learning more about the innovation (Stages 1 & 2). They are not really concerned about the consequences of the innovation (Stage 4) or about collaborating with others (Stage 5), nor do they have other ideas about the innovation (Stage 6) (George et al., 2008). “The overall profile suggests and reflects the interested, not terribly overconcerned, positively disposed nonuser” (George et al., 2008, p. 39). In contrast, the profile of Cooperators is indicated by peaks in informational concerns (Stage 1) and collaboration concerns (Stage 5) and displays an M-graph (Pant et al., 2008b; Fig. 1). Members of this profile want to have more information about the innovation (Stage 1) and want to learn from the knowledge and handling of others (Stage 5). In general, they are more open to the innovation (Bitan-Friedlander et al., 2004; George et al., 2008; Pant et al., 2008a, 2008b). Following Hall and Hord (2020), the Impact Concerns Profile represents “the ideal goal of a concern-based implementation effort” (p. 116), because good schooling is “teachers with high Impact concerns about the effects on students of their use of the innovation (Stage 4 Consequences) and about linking with other teachers in using the innovation (Stage 5 Collaboration)” (p. 116). Moreover, George et al. (2008) describe the members of this profile as typical team leaders, who coordinate the work of others. According to Hall and Hord (2020), this profile is rarely found.

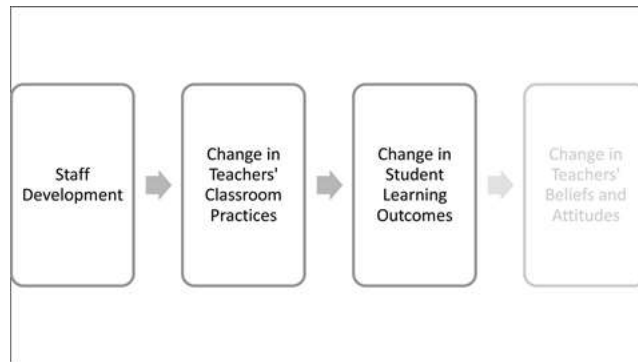
So, based on the interpretation, the Cooperators and Impact Concerns Profile can be assumed to be more cooperative than the Opponents or Nonusers in view

of the regarding innovation.

### *1.2. The Stages of Concern in the implementation process*

Focusing on the professional development, the Stages of Concern are the personal side of this context, because they characterize the way in which participants deal with an innovation in an affective and cognitive way, that is, how they feel about the innovation, occupy themselves with it, as well as think about the innovation and consider it (Hall & Hord, 2020). Theoretically, it can be assumed that communication and emotional aspects predict these reactions of participants in an implementation process (Wagner, Fries, Gerndt, Schaefer, & Schüppel, 2010; see Teerling, Bernholt, Asseburg, Hasl, & Iglér, 2018). Empirically, it has already been shown that communication aspects are associated with the Stages of Concern on a single-dimension level (see Teerling et al., 2018) and that individual features such as motivation (Iglér, Ohle-Peters, Schlitter, Teerling, & Asseburg, 2018; Trempler, Schellenbach-Zell, & Gräsel, 2013) and enthusiasm (Rohrbach, Graham, & Hansen, 1993) are considered to be highly important in implementation processes in schools. Therefore, regarding professional development — and especially the Stages of Concern as one aspect of professional development — communication and emotional factors should be taken into account.

To analyze the chain of effects following the professional development, the model of teacher change by Guskey (2002) theoretically provides a valuable and adequate approach to describe the subsequent change or, rather, the implementation process. The model assumes a process in which professional development results in a change in teachers' attitudes and perceptions by first changing the classroom practices of the teachers, followed by a change in students' learning outcomes (Fig. 2; see McElvany, Ohle-Peters, Iglér, Schlitter, & Köller, 2018). The model suggests that an improvement in the learning outcomes of students results from changes teachers have made in their classroom practices — such as using a new method to diagnose or promote the students — after they were trained to do so in the context of their professional development (Guskey, 2002). Our research focuses on the first three parts of the model: (a) professional development, (b) change in teachers' classroom practice, and (c) change in student learning outcomes by describing teachers' concerns about an innovation as one aspect of their professional development (a) that affects how they change their teaching in classrooms (b), which should result in students' achievement outcomes (c) such as test scores.



**Fig. 2.** A Model of the Process of Teacher Change (Guskey, 2002). Faded: Part of the model that is not relevant regarding the current study.

### ***1.3. The structure of the BiSS program***

The present research relies on the program “Education through Language and Writing” (in German: Bildung durch Sprache und Schrift; BiSS). The BiSS program was initiated in 2012 to review various activities for the diagnosis and promotion of language and writing from nursery to secondary school (see Becker-Mrotzek, Hasselhorn, Roth, & Stanat, 2016). The program was designed as a *bottom-up* process, meaning that the schools encourage the innovation within their school and decide themselves whether to join the program. However, the contents of the modular program (training and materials) are organized *top-down*, that is, the initiators of the program and the researchers provide them to the participating schools (Gräsel & Parchmann, 2004; see McElvany et al., 2018). Within the BiSS program, BiSS-EvalLesen evaluates the activities of reading promotion (Modules 3 “Diagnosis and promotion of reading fluency and its conditions”, and 4 “Diagnosis and promotion of reading comprehension”) in elementary schools in seven regional network associations in different German federal states (McElvany et al., 2018).

### ***1.4. The current study***

Based on the theoretical background, the empirical findings, and in order to determine what factors predicted the underlying concern profiles, we considered (*communicative*) *skills, quality of cooperation, frequency of cooperation, composition of the project group, and communication within the team* as communication factors to be relevant factors predicting the underlying concern

profiles during the professional development. Additionally, as emotional factors, we included *motivation* and *enthusiasm* with regard to giving lessons in reading, *excessive demands*, and *satisfaction* with regard to the innovation in the analyses.

Following the aforementioned model from Guskey (2002), it can be assumed that the way in which principals and teachers deal with an innovation as one aspect of their professional development affects their classroom practice, which might result in an adoption and, furthermore, might affect their behavior within the teaching staff and on an organizational level, which might lead to a diffusion of the innovation. Therefore, we used the adoption and *diffusion of the innovation* (Rogers, 2003) as possible outcomes regarding principals' and teachers' concerns, which assessed the degree to which they dealt with the innovation in an affective and cognitive way. We operationalized the adoption by examining the self-reported *mental*, *practical*, and *sensitive development* since the implementation process had started. Following the model, we also checked the extent to which principals' and teachers' self-reports were associated with the student learning outcomes — measured by the *students' reading proficiency*.

To the best of our knowledge, integrating the concern profiles into such an implementation process model and linking them with scales of participants' adoption and diffusion of the innovation as well as students' learning outcomes has not been done before. The purpose of this study was not only to identify factors that may foster a more cooperative concern profile but also to investigate the role that concern profiles themselves play in the conceptualized implementation process. Because it can be assumed that it makes a difference in the implementation process, especially with regard to the diffusion of the innovation within the school, how the principals — as gatekeepers and supervisors — or the teachers react concerning the innovation, we distinguished between principals and teachers in all analyses. The following research questions were addressed:

- 1) *Which concern profiles appear with regard to principals and teachers in the implementation process in the context of BiSS-EvalLesen?* Based on the existing results (e.g., Bitan-Friedlander et al., 2004; George et al., 2008), we expected to identify different profiles. In terms of the specific evaluation project (BiSS-EvalLesen), we anticipated identifying cooperative profiles such as Cooperators or the Impact Concerns Profile in contrast to Nonusers or Opponents.

2) *Which individual communication and emotional features predict the profile affiliation?*

We estimated finding communication and emotional features associated with the way that the concern profiles can be interpreted based on the existing results (e.g., Bitan-Friedlander et al., 2004; George et al., 2008). Following this the affiliation with a Cooperator profile might be predicted by higher cooperative support from colleagues or personal motivation to give lessons in reading.

3) *To what extent do the profiles predict the adoption and diffusion of the innovation?*

We expected to find the adoption and diffusion of the innovation to be associated with the way that the concern profiles can be interpreted, too. So, we anticipated that a Cooperator profile would predict the self-reported development and diffusion of the innovation even more than Nonusers or Opponents.

4) *To what extent do the concern profiles predict students' learning outcomes in reading when taking the adoption and diffusion of the innovation into account?*

Based on the model of Guskey (2002), we anticipated that the way in which the participants dealt with the innovation (concern profiles) would predict the adoption and diffusion and, ultimately, the students' achievement

## II. METHOD

### 1.5. *Sample*

The data used in this study were collected at the second time of measurement in the project BiSS-EvalLesen. So, in summer 2016,  $N = 33$  elementary schools with  $N = 71$  principals and teachers were surveyed by digital questionnaires, which were developed specifically for the BiSS program in the field of reading in elementary schools. A total of 30 principals and 41 teachers completed the questionnaires, but five cases had to be excluded, because they were not part of the sample due to their job description. Therefore, the final sample consisted of  $N = 66$  individuals (89 % female, 8 % male, 3 % missing). The distribution of female and male teachers within the sample is comparable with the general distribution of elementary school teachers in Germany (89 % female, 11 % male; Federal Statistical Office Germany, 2016). The principal and teacher



subsamples did not differ regarding the sex distribution (principals: 87 % female, 7 % male; 7 % missing; teachers: 92 % female; 8 % male). Concerning the age distribution (25–29 years old: 5 %, 30–39 years old: 18 %, 40–49 years old: 27 %, 50–59 years old: 41 %, over 60 years old: 9 %), the sample is also comparable with the general distribution of teachers in Germany (Federal Statistical Office Germany, 2016). As to be expected in view of the career status, the age distribution differed between the principal and teacher subsample so that the principals were likely to be older than the teachers (principals: 30–39 years old: 3 %, 40–49 years old: 23 %, 50–59 years old: 60 %, over 60 years old: 13 %; teachers:

25–29 years old: 8 %, 30–39 years old: 30 %, 40–49 years old: 30 %, 50–59 years old: 25 %, over 60 years old: 6 %). The average duration of working as a qualified teacher was 21.25 years, with a large range from two to 42 years ( $SD = 11.2$ ;  $Mdn = 19.5$ ). The respondents had been taking part in the BiSS program on average for 21.6 months ( $SD = 9.88$ ;  $Mdn = 21$ ). The observed schools employed  $M = 20.18$  teachers, with a large range from six to 44 teachers per school ( $SD = 10.63$ ;  $Mdn = 19$ ).

In the context of the “Trends in Student Achievement” (Bildungstrend), which is the national assessment study in Germany, from the Institute for Educational Quality Improvement (Institut zur Qualitätsentwicklung im Bildungswesen; IQB), we were able to survey student achievement data on reading comprehension in the project schools in 2016, too (see Stanat, Schipolowski, Rjosk, Weirich, & Haag (Hrsg.), 2017). Data were collected from  $N = 736$  fourth-grade students. Of those,  $N = 572$  students were linked to the present principal and teacher data set. For five schools, no student data were available. The remaining schools participated with one class each; only in three schools were two classes assessed ( $M_{\text{students}} = 20.73$  per school). 54.1 % female and 45.9 % male students took part in the data collection. On average, they were  $M = 10.42$  years old ( $SD = 0.87$ ; 35 cases missing).

### 1.6. Measures

The main instrument used to evaluate the attitudes towards the innovation (Stages of Concern) was a well-established questionnaire (Pant et al., 2008a, 2008b) that was translated and adapted from the Stages of Concern questionnaire by Hall and Hord (2020). Each stage was measured by five items — as recommended by Hall and Hord; resulting in a total of 35 items (Table 2).

The respondents were asked to indicate the degree to which each concern is true for them by marking 1–7. High numbers indicate high concerns; low numbers, low concerns. They also could mark 0, which indicates very low concerns or irrelevant items (George et al., 2008). Because Stage 0 showed low reliability, it was excluded from the following analyses. Based on an exploratory factor analysis (EFA), two items in Stage 6 were eliminated, thereby increasing the internal consistency from .40 to .59. For the means, standard deviations, and intercorrelations of the stages, see Tables A1 for the principals' and A2 for the teachers' data (Appendix). The scales that were used to measure the communication and emotional aspects are shown in Tables A3–A5 (Appendix). The self-reported development since the implementation process had started was adapted from a German, nation-wide program on teacher professional development called Sinus-Transfer/Sinus for elementary schools (e.g. Fischer, Dedekind, Rieck, Prenzel, & Köller, 2010; Ostermeier, 2004; Fischer, Döring, Rieck, Trepke, & Köller, 2014). Via EFA, we identified four subscales; three of them are discussed in this article: mental development, practical development, and sensitive development. The fourth subscale was not used because it focusses on the external development (parents, etc.), which is not relevant in the underlying theoretical model. *Mental development* was represented by five items (example: “I now think about reading lessons in a more systematic and structured way.”), *practical development* was measured with four items (example: “I tried new content out in the reading lessons.”), and *sensitive development* with two items (example: “I’m more sensitive to learning difficulties regarding reading.”). The participants indicated how they perceived their development since the implementation process had started on a four-point scale ranging from (1) *do not agree* to (4) *agree completely*. Reliabilities (Cronbach’s  $\alpha$ ) of the scales varied between .79 and .88.

The innovation diffusion scale (adapted from Sinus for elementary schools; see Zentrale Koordinierungsstelle “SINUS an Grundschulen”, 2018) was measured by four items (example: “In my school, most of the teachers are familiar with the BiSS project.”). The four-point scale ranged from (1) *do not agree* to (4) *agree completely*. To increase the reliability, we excluded one item by EFA, thereby achieving an internal consistency of Cronbach’s  $\alpha = .75$ .

To measure students’ outcomes, a standardized competence test in reading was used (for a more detailed description of the instruments see Bremerich-Vos, Böhme, Krelle, Weirich, & Köller, 2017). Overall, we used six different test booklets that had some common items (anchor items) that were taken from the

national assessment in Germany at the end of Grade 4 (see Stanat et al., 2017). Students' responses were scaled based on a one-dimensional item response theory (IRT) model (Rasch model; Embretson & Reise, 2000) using the package TAM (Robitzsch, Kiefer, & Wu, 2018) in the statistics program R. The resulting estimators of reading comprehension (Weighted Likelihood Estimates, WLEs; Warm, 1989) were transformed, resulting in a national scale with a mean of  $M = 500$ , and a standard deviation of  $SD = 100$ . The WLE reliability in our sample was .68, which can be characterized as acceptable.

### 1.7. Data analysis

In order to analyze the principals' and the teachers' data separately, the variables used in the model were chosen on the item level and the mean scales were computed using SPSS (Version 23). Because the principals' data were on the school level, we excluded cases from the teachers' data in order to lift them on to the school level, too (resulting in  $n = 29$ ; for one school, no teachers' data were available). As selection criteria, we used the participants' duration of participation in the program (see McElvany et al., 2018). Based on the Stages of Concern, different models for latent profiles were tested (latent profile analysis, LPA) with *Mplus* 7.4 (Muthén & Muthén, 2015) against each other (ranging from 1 to 4 profiles) by distinguishing between principals and teachers and using full information maximum likelihood (FIML) for taking missing values into account. Homogeneous variances were allowed in the analyses (see Grimm, Mazza, & Davoudzadeh, 2017). Using model fit tests (Akaike [AIC], Bayesian [BIC], sample-size adjusted Bayesian [aBIC]; Nylund, Aspaouov, & Muthén, 2007) and relative model fit tests (Lo-Mendell-Rubin adjusted test [ $p$  LMR], Young-Lo-Mendell-Rubin Likelihood Ratio Test [ $p$  VLMR]) and the entropy test (Clark & Muthén, 2009), the best models were selected (Table A6). As the BIC test in particular proved its worth in deciding on the number of classes (Nylund et al., 2007), we focused on this criterion, in which smaller values indicate a better data fit. Due to the small sample size, in the principals' data, the standard errors of the solutions with three or more classes might not be trustworthy. Also due to the small sample size, the standard errors in the teachers' data might not be trustworthy. Thus, as a robustness check, we also conducted latent profile analyses with the full teacher sample ( $n = 36$ ), in which we considered the cluster structure. Due to completely missing values on the relevant variables, two cases were excluded from the teachers' data set in this analysis (resulting in  $n = 34$  teachers). The results confirmed the findings

of the smaller sample (see Appendix: Table A7 and Fig. A1).

Due to the small data sets and the high entropy of the LPA models, the profile affiliations were added as manifest variables to the principals' and teachers' data sets. We removed the missing values by conducting multiple imputations separately for the principals' and the teachers' (15 iterations) as well as for the students' data (50 iterations). To impute the students' data, we used the class list information (sex, age, German as first language, refugee background, German and math grade) as auxiliary variables (Collins, Schafer, & Kam, 2001). Nevertheless, we had to exclude 33 student cases in which all relevant variables were missing (resulting in  $n = 539$  students). Main findings

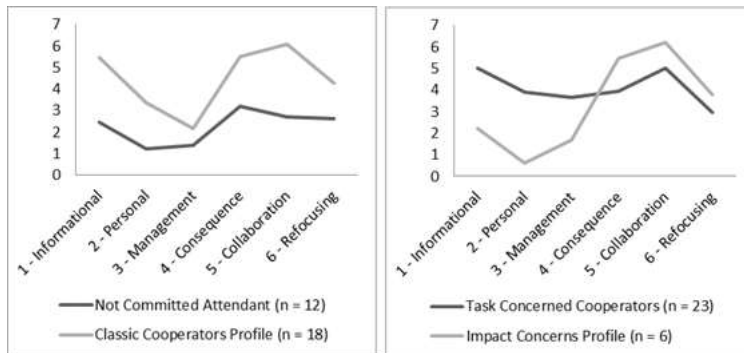
### *1.8. Profiles of participants*

Based on the LPA model comparisons, two profiles of principals and two profiles of teachers were identified — due to the decreasing BIC in the three-classes solutions (Tables A6 & A7 ; Appendix). The means and standard deviations are shown in Table 3. Both profiles that were identified for the principals' data were multiple-peak user profiles (George et al., 2008) characterized by high Stage 1 and low Stage 2 concerns.

According to George et al. (2008), these results suggest that these persons need more information about the innovation itself: “These respondents generally are open to and interested in the innovation” (p. 53). In the case of the second peaks, the principal profiles differed from each other. The first profile ( $n = 12$ ) showed a high Stage 4, which indicates concerns about the consequences of the use of the innovation for the students (George et al., 2008). However, the fact that Stage 6 was also proportionally high could be an indication that the principals might have ideas about how to change the innovation to reap more benefits or how to replace it with a more powerful alternative (George et al., 2008). Pant et al. (2008b) found a similar profile, but with a lower Stage 4, and called it “Not Committed” (p. 838). Because the present profile showed a high Stage 4, which indicates an interest in the consequences, we called it Not Committed Attendant. The second profile ( $n = 18$ ) showed a high Stage 5, which suggests concerns about working with others in relation to the use of the innovation. Given that Stage 4 was also high, it can be assumed that the principals have concerns about a collaborative effort in relation to the consequences of the use of the innovation for the students. According to George et al. (2008), the combination with the high Stage 1 also suggests a desire to learn from what others know and are doing, rather than a concern to lead the

collaboration. Even though Stage 0 is missing, we can assume an M-graph, which is the Classic Cooperators Profile (see Section 1.1. and Research Question 1) and supposed to be more cooperative than the Not Committed Attendant (Fig. 3).

The first teacher profile ( $n = 23$ ) was a multiple-peak user profile, too (Fig. 3). It was similar to the second principal profile,



**Fig. 3.** Types of principals: Not Committed Attendant and Classic Cooperators Profile (see Pant et al., 2008b; Bitan-Friedlander et al., 2004); Types of teachers: Task Concerned Cooperators and Impact Concerns Profile (see Pant et al., 2008b; Hall & Hord, 2020);  $n_{principals} = 30$ ;  $n_{teachers} = 29$ .

**Table 4**

Predictors of the profiles by subsamples.

Variable	Principals			Teachers
	$\beta$	<i>SE</i>	$R^2$	$\beta$
(Communication) Skills	0.74	0.45	.462	0.24
	0.36	.158		
Quality of Cooperation	0.20	0.22	.046	0.19
	0.19	.144		
Frequency of Cooperation	0.58*	0.28	.341	0.11
	0.32	.119		
Project Group	0.27	0.28	.065	-0.03

	0.28	.109		
Communication within the Team	-0.15	0.22	.025	
	0.23	.158		
Motivation	0.68*	0.28	.422	0.67*
	0.33	.416		
Enthusiasm	0.72*	0.30	.484	-0.10
	0.30	.116		
Excessive Demands	-0.40	0.37	.220	-0.51
	0.34	.347		
<hr/>				
Satisfaction with the Innovation	0.09	0.37	.067	
	0.61**	0.19	.457	

*Notes.* Coding: Principals: 0 = Not Committed Attendant, 1 = Classic Cooperators Profile, Teachers: 0 = Task Concerned Cooperators, 1 = Impact Concerns Profile;  $\beta$  = full standardized regression coefficients; model-wise Pseudo- $R^2$ ; Control variable: School Size;  $n_{\text{principals}} = 30$ ,  $n_{\text{teachers}} = 29$ ; \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

although it showed a lower range within the stages and a higher Stage 3. That indicates that the teachers have high concerns about logistics, time, and management concerning the innovation (George et al., 2008). Because we can assume the M-graph again, even though Stage 0 is missing and Stage 3 is higher, we called this profile Task Concerned Cooperators (Research Question 1). The second profile ( $n = 6$ ) that was identified concerning the teachers' data was a typical single-peak user profile (George et al., 2008). According to George et al. (2008), the profile peaks at Stage 5 indicate that the respondent is very interested in working with colleagues or others in coordinating the innovation (see Section 1.1). It is similar to the Impact Concerns Profile defined by Hall and Hord (2020), even though Stage 0 is missing and Stage 1 is slightly higher than that presented by Hall and Hord, and supposed to be more cooperative than the Task Concerned Cooperators.

As the results show, none of the profiles represent the characteristics of Nonusers as described in the theoretical background (see George et al., 2008). Thus, it can be assumed that the participants in the BiSS program dealt with the innovations in a more positive way (see Teerling et al., 2018). Discussion

The purpose of this study was to investigate the role that the concern profiles

of principals and teachers play in an implementation process for the promotion of reading in elementary schools. Based on the present data sample and the model from Guskey (2002), we were able to show that, on average, nearly two years after the implementation had started, the concern profiles predicted not only the adoption and diffusion (Research Question 3) but also the conceptualized implementation process overall — resulting in students' achievement, too (Research Question 4).

### *1.9. The attitude does matter*

It is remarkable that even though the concern profiles differed in the subsamples of principals and teachers, the ones that were more cooperative were positively associated with the implementation process in general. So, the results are consistent in both subsamples for teachers and principals. Even though we were not able to draw conclusions about the wave motion in the Concerns Theory, our data show that higher waves in later stages seem to have positive effects on the implementation process. In addition, our data show that the Impact Concerns Profile, which, according to Hall and Hord (2020), is the ideal goal of a concern-based implementation effort, is associated with more positive outcomes. It is also remarkable that the profiles did not predict the WLE directly; only the computed path models uncovered the indirect relations. Regarding the principals, it was not surprising that the Classic Cooperators Profile showed a higher development than the Not Committed Attendants. But, with regard to the teachers, it is notable that the Impact Concerns Profile indicated a significantly higher development — even though the Task Concerned Cooperators were also open to and cooperative in view of the innovation (see Bitan-Friedlander et al., 2004; Pant et al., 2008b; Hall & Hord, 2020). The principals and the teachers showed strong indirect effects of the mental development on the students' learning outcomes, even though they were not statistically significant, which might be an effect of the small samples in the current study. In addition, the teachers showed a strong indirect effect of the profile on the diffusion, which was also not statistically significant.

### *1.10. Limitations*

Some limitations need to be mentioned regarding the results of this study, such as the small sample size already referred to and the cross-sectional design. A larger sample would have been desirable to confirm our findings, especially

as this would enable the transfer of the underlying basic ideas to other intervention themes and goals. The fact that our results approximately replicate the concern profiles found in previous research supports the validity of our results. Although we already replicated the observed path models in our two subsamples, replicating them in another implementation process could be an aim of future research to provide additional validity for our findings. Furthermore, a longitudinal design would have strengthened the findings — especially to track a possible increase in the self-reported development and the students' learning outcomes over time. The interpretation of the Stages of Concern was hindered by the fact that Stage 0 had to be excluded from our analyses, which was necessary because of the low reliability. Using LPA and interpreting the analyzed profiles, we did not find a Nonuser profile, which is a good result in view of the evaluation project (BiSS-EvalLesen), but also a limitation for the analyses that may have resulted from a positive selection through the program or social desirability. In addition, the dependent variables regarding the first three research questions were surveyed based on the self-reported perception of the participating principals and teachers. Thus, general limitations concerning the reliability and validity of self-report measurements must be considered (McGraw et al., 2000). Because of the data structure, the teachers' and students' data were linked on the school level, indicating that the variance within schools was disregarded (school means).

Future research with bigger sample sizes is needed to confirm these results. Moreover, future research should take the fact into account that the effect of the mental development on students' learning outcomes might be mediated by the diffusion as well as the fact that the mental development might mediate the effect of the profile on the diffusion.

### ***Conclusions***

Although there are limitations, this study offers valuable insights into the implementation processes in schools. When using a person-centered approach, emotional elements seem to be important in predicting the profiles that indicate the Stages of Concern and the participants' opinions towards the innovation. Moreover, the route models demonstrated that the manner in which principals and teachers handle an innovation during the implementation phase does have an impact. It is noteworthy that even little differences, such as those between the Task Concerned Cooperators and the Impact Concerns Profile, appear to have an impact on the adoption, diffusion, and students' learning results, specifically in relation to the overall implementation process.

The strongest indicator of the principals' profile affiliation was their enthusiasm for



teaching reading. This suggests that the implementation process may be hindered if the principal, acting as a gatekeeper and supervisor, lacks enthusiasm for the specific theme or field of the innovation. Therefore, the implementation process may be facilitated if the administration or the individuals accountable for the innovation at an organizational level could gain the support of the principal (refer to Rohrbach et al., 1993). Given that satisfaction with the innovation emerged as the most influential factor in determining the teachers' profile affiliation, it is important to consider the participants' needs when designing, implementing, and assessing the innovation, with the possibility of making adjustments if necessary. Ultimately, teachers can enhance their own skills, spread the new ideas, and promote the academic achievements of their students.

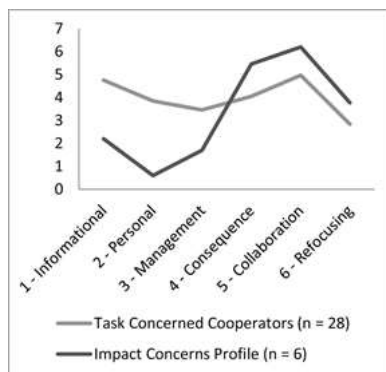
The future research should focus on differentiating between people and groups, as well as examining changes within an individual. This requires the use of a longitudinal design. By employing latent transition analyses, it may be feasible to delineate a developmental process that aligns even more closely with the original concept proposed by Hall and Hord (2020). Furthermore, the inclusion of beliefs in the route model can be used to empirically evaluate the comprehensive meaning of Guskey's (2002) approach. Due to the distinct demands and duties of administrators and teachers in relation to innovation and implementation processes, it is recommended to differentiate between these two groups. Furthermore, we suggest enhancing Guskey's (2002) model by incorporating the Concerns Theory. According to our data and analysis, we suggest that professional development can only result in a modification of classroom practice if there are corresponding alterations in teachers.

Moreover, it is necessary to verify and authenticate the Stages of Concern by gathering additional quantitative data. This should include examining correlations with proven data collection methods that measure similar domains, such as affective and cognitive scales. The current findings establish a starting point for future research, particularly on the identified connections between enthusiasm and satisfaction, as well as self-reported personal growth.

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### **Declaration of Competing Interest**



**Fig. A1.** Types of teachers (Impact Concerns Profile, Hall & Hord, 2020);  $n_{\text{teachers}} = 34$  (two cases missing).

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