

Shared meaning, one step closer to understanding educational reform

An investigation from a sense making perspective on how shared meaning among teacher team members
can be established to support educational change

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Abstract

Being able to formulate a shared meaning is highly beneficial for teachers that work in teams to adapt their teaching practices to changes in policy. In this study we operationalized and measured shared meaning and investigated how factors contributed to the formation of shared meaning among team members. Working from a sense making perspective, the relations between external influences (transformational leadership), a cognitive interpretation template for subsequent action (efficacy beliefs), actions to discover inconsistent information (information providing and receiving), and shared meaning were analyzed using a multi-level structural equation model. Data was gathered from 250 teachers working within 26 teams of one VET college. Results showed that collective information providing and receiving is an important predictor of shared meaning among team members. Collective information providing and receiving on its turn is fueled by collective-efficacy and a vision shared by the transformational leader. These and other findings are discussed.

Introduction

At the moment, secondary vocational education and training (VET) colleges in de Netherlands are confronted with a number of policy changes. In response to criticism on the quality and governability of the VET colleges, in 2011 the Minister of Education presented a plan for policy change which contains measures that are supposed to enhance their performance (Ministerie van Onderwijs Cultuur en Wetenschap [OCW], 2011). Measures that have the greatest impact on existing curricula are the intensification of education from 850 to 1000 hours at school a year, the shortening of four-year programs to three years and the revision of the competence files. These measures come on top of measures that were already introduced like the competence based education, professional development of teachers and the central examination of languages and mathematics (OCW, 2007).

At a VET college in the east of the Netherlands, teacher teams are responsible for the implementation of curriculum changes. Those teams are led by a team coordinator and fall under so called MBO Colleges. There are 12 MBO Colleges (ROC van Twente, 2013, March 12) that have the freedom to take the policy forwards within the boundaries set by the Executive Board. However, previous research shows that it is not self-evident to expect that teachers are consciously involved in curriculum change and that it is difficult to change teachers' practices (Fullan, 2007). Since the teacher teams are asked to revise their curricula on a regular basis, ROC van Twente has a desire to gain insight in educational change processes that exist in these teams. The aim of this investigation is to provide insight by constructing a theoretical framework that contains factors which are argued to foster educational change. Teacher teams are tested on the presence of these factors. Furthermore, relations in the model that are derived from the theoretical framework are tested.

Theoretical framework

The environment of education continuously changes due to internal and external organizational forces, such as changes in student population, on the labor market, and in available resources (Fullan, 2007). Teachers continuously have to adapt and improve their practices to deal with those forces (Fullan, 2007; Thoonen, Slegers, Oort, Peetsma, & Geijsel, 2011). In a NEW Meaning of Educational Change Fullan (2007) argues that in order to adapt to changes, teachers should always follow the process of constructing "shared meaning", or else change will fail. He defines shared meaning as the "interface between individual and collective meaning and action in everyday situations" and the place "where change stands and falls" (p. 9). In other words, teachers have a common understanding of the goals they pursue and which actions they have to take to reach these goals.

When shared meaning is reached, the right balance is found between bottom-up and top-down organizational forces that guide the implementation process and teachers have collectively internalized the new situation. Without a good balance between those two forces there is either a situation in which changes are dysfunctional because they are realized from the top down and teachers feel forced to change, or a situation with a lack of focus. Educational changes in the context of this investigation are posed top-down by the government and school board. This means that there is a risk that teachers feel forced to change and do not internalize the new curriculum. In the best case they reluctantly do what is asked, without a clear and shared understanding why. In other words, teachers are likely to lack a shared

meaning on which everyday action can be based. As such, it is vital to know the extent to which teachers can make sense of the change and can come to formulate a shared meaning.

Shared meaning can emerge when teachers make sense of the constraints and opportunities of situations in which they collaborate with each other towards finding similar or coordinated ways to conduct their teaching practices. Sense making is an integrated and iterative process that involves the finding of information in the environment, especially inconsistent information, and comparing it to expected states of the environment, all to base actions on it (Weick, Sutcliffe, & Obstfeld, 2005). Additionally, the process itself can be under influence of external forces. For instance, when someone draws a teacher's attention to some inconsistency, and possibly model an appropriate response. From the sense making perspective we view the individual and joint conceptions and information finding activities of teachers as a coherent whole. Teachers individually and jointly make sense of the information that is produced by the conceptions and information finding activities. Personal insights are shared with colleagues, which may lead to (new) collective insights. They decide on what the sense of the current situation is and how this situation can be altered so it resembles the desired situation. Shared meaning among teachers about the provided education is the result of the joint sense making process of teachers. Sense making is the process, and shared meaning is the outcome of this process.

Whereas finding inconsistent information takes place within seconds, carrying out the actions that result from the interpretation of the information takes longer. In order to make sense of policy changes, many iterations are required before a whole team is ready to formulate their shared meaning of the policy, and this may take days or even months. Thus, in the context of policy change, the sense making process takes place over a wide time range, and, on a structural basis, describes people actively searching for information every time they are confronted with a situation that is in a different state than it is expected or desired to be. To structurally relate this process to the formation of a shared meaning we have to zoom out from process of immediate interpretation and action to a structural process of actively searching for, and distributing of, information while interacting with team members. This has as a consequence that we need to conceptualize sense making crudely, such as that it is about past experiences, future actions and the discovery of (non-consistent) information.

This investigation is unique in that an attempt is made to operationalize and measure shared meaning, and to relate it to factors that have been found to positively influence educational change. Additionally, because a shared meaning on how to change education is the result of the alignment of the sense making processes of all team members, we are not only interested in processes leading to teacher change on the individual level, but also on the team level. This is in line with the expressed need to administer complex multi-level models on change in educational settings (Oude Groote Beverborg, Slegers, & van Veen, submitted-b). More specifically, the relations between external influences (transformational leadership), a cognitive interpretation template for subsequent action (efficacy beliefs), actions to discover inconsistent information (professional learning), and shared meaning (of the policy change) will be investigated using a structural multi-level path model using data from 250 teachers and 26 teams from one VET college.

Shared meaning

In this study, shared meaning is defined as the extent to which members of a team have reached consensus about the goals and organization of teaching. Shared meaning among teachers is seen as a team property that forms the basis and precondition for action on a daily basis in a coherent and meaningful manner. When teachers have to change their education, they have to reset or adjust their shared meaning jointly to maintain coherence. In this investigation we focus on the degree to which shared meaning with respect to the future situation as proposed by the government (intensified curriculum), is currently present in the teams.

Professional learning

In contrast to traditional training and education, ongoing professional learning in the workplace takes place throughout the lives of teachers and is considered to be the answer to continuous adaptation and improvement in reaction to forces that demand educational changes (Thoonen et al., 2011; van Woerkom, 2003). During professional learning teachers critically reflect upon their current practices and communicate about it with others to discover and bring potential hiatuses into existences (van Woerkom,

2004). Professional learning is an active constructive process that takes place in a social context (Oude Groote Beverborg et al., submitted-b). It is important to respect the social component of professional learning, otherwise it is likely that changes will be limited to the individual (van Woerkom, 2004).

In educational reform literature, different professional learning activities like self-reflection, feedback asking, and information providing and receiving are related to change (Kassin, Fein, & Markus, 2008; Runhaar, 2008; van Woerkom, 2003). Information providing and receiving (IPR) seems to be of particular importance, in the first place because through IPR non-consistent information can be elicited among team members. This is important to make the teachers aware of a possible discrepancy between the current and the desired situation, on which actions to restore a desired state of the teaching environment can be based. Secondly, colleagues have to provide each other with information so ties can be formed between team members, which can create a common base for action (Spillane, Kim, & Frank, 2012). IPR is inherently interactive and aims at improving the practices of others and changing the organization. The activity is presumed to result in changes on the team level (Runhaar, 2008). IPR makes implicit assumptions and opinions of individuals explicit and negotiable to others and therefore fosters the dialogue on established opinions. New insights are made available and new knowledge is created. To our knowledge, researchers have solely investigated what we can call *individual* IPR, which refers to the perceived attempts of an individual to provide others with information or knowledge, or gather information or knowledge from others for personal use. It can be easily imagined that when many team members go about sharing what they know with each other, individual teachers can also notice that IPR is a characteristic of the group (not unlike a norm). In this investigation *collective* IPR is added, to incorporate perceived attempts to share knowledge in the team, and to test its correspondence with individual IPR. Where individual IPR can be seen as an individually initiated activity that takes place in interaction with others, collective IPR can be seen as a property of the team.

We state that teachers that provide each other with information, actively search for, and elicit information that potentially gives direction to change in a positive way. Only when the flow of information runs fluently within the whole team, teachers can be able to create a common understanding of the situation on which coherent action is based. Therefore, it is expected that IPR has a positive effect on shared meaning (*hypothesis 1*). Furthermore, we expect that higher levels of individual IPR are positive related to shared meaning because when more teachers are likely to share knowledge with their colleagues, collective IPR will be higher. Following the above, it is expected that the effect of individual IPR is mediated by collective IPR (*hypothesis 2*).

Efficacy

Efficacy is a psychological factor that is based on past experience and gives direction to future action. It is often related to professional learning activities (Geijsel, Slegers, Stoel, & Krüger, 2009; Oude Groote Beverborg et al., submitted-b; Truijen, 2012; van Woerkom, 2003). Efficacy is the expectation of competence to deal effectively with a particular future task (Bandura, 1977; Woolfolk, Hughes, & Walkup, 2008). Efficacy can be a characteristic of the individual (self-efficacy) as well as a property of the team (collective-efficacy). The former refers to expectations regarding individual behavior (Bandura, 1977; Woolfolk et al., 2008) and the latter refers to expectations regarding group behavior (Jung & Sosik, 2002). Positive *self-efficacy* is related to persistence, less fear of failure (Runhaar, 2008), greater resilience (Yost, 2006), and professional learning in the workplace (Goddard, Hoy, & Hoy, 2000, in Geijsel et al., 2009). While executing learning activities, teachers are potentially exposed to disconfirming information (van Woerkom, 2004). In addition, teachers that share knowledge including personal opinions, run the risk of being seen as a trouble maker by fellow team members, when they do not conform with established images of the group (van Woerkom, 2004). Teachers with higher self-efficacy are more likely to challenge the disconfirming information (Geijsel et al., 2009; Thoonen et al., 2011). Challenging disconfirming information is necessary to find ways to bridge a potential gap between the current and the desired situation.

Collective-efficacy on the other hand, refers to the shared perceptions of the group members of the competence of the whole team to deal effectively with a course of action (Bandura, 2000; Jung & Sosik, 2002; Truijen, 2012). It is positively related to perceived group performance (Jung & Sosik, 2002) in situations with high task interdependence (Katz-Navon & Erez, 2005), as we expect to be the case in teacher teams providing a coherent curriculum. It can be argued that when the competence of the group

members is perceived to be higher, team members are more likely to provide each other with information because it is more useful to share information with competent colleagues than with incompetent colleagues. Following the above, it is expected that the effect of efficacy on shared meaning is mediated by IPR (*hypothesis 3*).

Transformational leadership

Above we described the role professional learning activities can play in discovering, and providing each other with, (non-consistent) information, and the function of efficacy as a psychological factor in this process. In this paragraph the focus is on an external factor that promotes the detection of non-consistent information and guides how this information is handled within the team.

Leadership is “the position or function of a leader, a person who guides or directs a group” (Leadership, 2014, January 14). Different kinds of leadership can be distinguished. It depends on the context which style is more desirable (Avolio & Bass, 1995). In the organizational change literature a distinction is made between transactional and transformational leadership (TL). Transactional leadership focuses on maintaining the status quo while TL aims at development to achieve change (Geijsel, Slegers, & van den Berg, 1999). In a qualitative and quantitative investigation on factors that distinguish innovative schools from schools that are not innovative Geijsel et al. (1999) found three dimensions of TL that positively correlate with the degree of changed practice of teachers. These dimensions are: vision sharing, individual support, and intellectual stimulation.

Vision sharing refers to the extent to which a teacher experiences that an image is propagated that the school should meet. A vision makes clear what the goals of the organization are and gives content and direction to change (Geijsel et al., 2009; Geijsel et al., 1999; Thoonen et al., 2011). Vision sharing is positively related to learning activities (Geijsel et al., 1999), the internalization of school goals (Thoonen et al., 2011), and collective learning (Oude Groote Beverborg, Slegers, & van Veen, submitted-a).

Individual support refers to the perceived attempts to understand, recognize and satisfy the concerns and needs of individual teachers and relating those needs to the mission of the school (Dionne, Yammarino, Atwater, & Spangler, 2003; Geijsel et al., 2009) to elevate performance levels (Avolio & Bass, 1995). In a literature review on TL practices and team performance Dionne et al. (2003) argue that communication within teams is enhanced because the team environment is empowered by individual support. The support improves the relationship between the leader and each member of the team, which makes communication easier. In addition, good communication with the leader might have a positive effect on the communication with fellow team members.

Through *intellectual stimulation* the school leader makes sure that teachers become aware of their own ideas and values, and encourage teachers to challenge them (Thoonen et al., 2011). Intellectual stimulation empowers teachers to engage in functional team conflict in order to improve team performance and decision making. Dionne et al. (2003) describe functional team conflict as “a healthy form of conflict” that may result into “seeking differing perspectives, suggesting new ways of how to look at problems and encouraging non-traditional thinking” with the goal of “better team performance and decision making” (p. 186).

In a meta-analysis Yammarino, Dionne, Schriesheim, and Dansereau (2008) stress the importance of a multi-level approach considering leadership, because it provides a more complete view of the mechanisms and effects of leadership. They also state that little research has used a proper methodology to investigate the multi-level nature of TL. This multi-level view fits this investigation well, where the effects on shared meaning, a team property, are investigated. Actions of the leader affect the whole team, especially when he or she shares a vision directed at all team members. When it comes to more individualized interaction, like with intellectual stimulation and individual support, the leader is able to sort the same effect for each team member by adapting his or her interaction to the individual. Based on the above, we expect that the positive effect of TL on shared meaning is mediated both by IPR (*hypothesis 4*) and by efficacy (*hypothesis 5*).

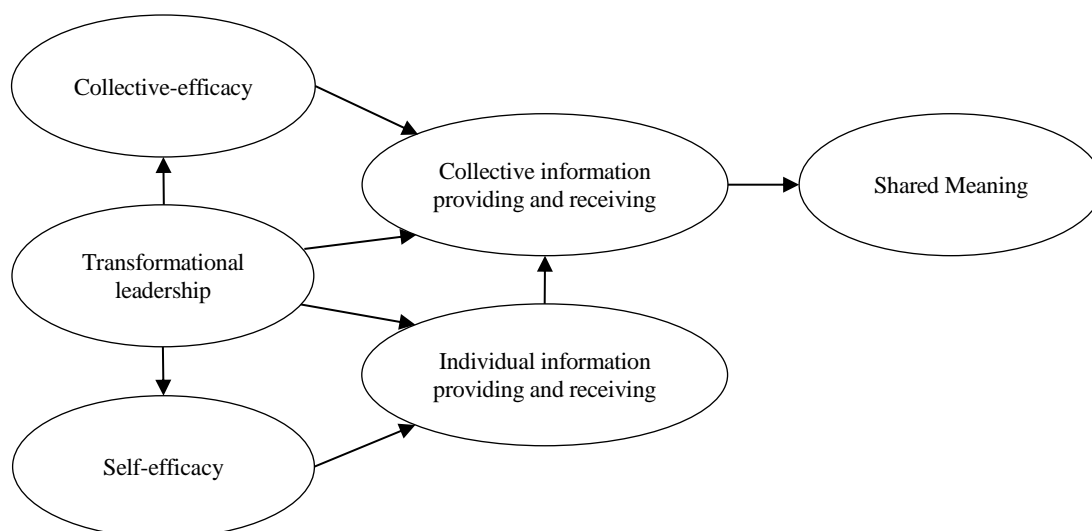


Figure 1. Model in which the effect of efficacy and transformational leadership on shared meaning are mediated by information providing and receiving. We expect the same relations to appear on both the individual level as on the team level, with the exception of the information providing and receiving – shared meaning relationship since this one is strictly team based.

Method

Sample

During a formative evaluation on the implementation of the curriculum changes two team coordinators were requested to participate in the investigation with their team from each VET college department. Additional team coordinators were approached by e-mail or with the help from other MBO College staff members. The coordinators of the teacher teams had to approve whether the team participated. They were encouraged to participate by the offer to get feedback on the results of their own team. The survey was administered during team gatherings when teachers were together. First the survey was briefly introduced by the test leader. Next, teachers were instructed by letter to fill out the questionnaire individually, not to skip any items, and to answer the questions intuitively. Furthermore, they were informed that participation was voluntary and reassured the survey was anonymous. Then, the surveys were filled out.

We gathered data of 250 teachers (45.2% male) divided over 26 teams and 8 departments. Ages ranged from 23 to 63 years (mean = 47.81 years, standard deviation = 10.75 years). The teachers had a median working time as a teacher of 10 years, a median job size of at least 22.8 hours a week, with the following education levels 7.1% vocational education, 81.6% higher education, and 5.2% academic education.

Measures

A survey was constructed from well validated scales on information providing and receiving (Runhaar, 2008) self-efficacy (Runhaar, 2008), collective-efficacy (Jung & Sosik, 2002), and TL vision sharing, individual support and intellectual stimulation (Geijsel et al., 2009). In addition two scales were developed to measure “shared meaning”, and another to measure collective IPR instead of just the efforts of the individual to share knowledge with colleagues. The transformational leadership scales are focused on the team coordinator since he or she is the leader of the team and the link between policy and teacher practices.

Initially the paper and pencil survey consisted of 49 items divided over 9 scales. All items were scored on a 5-point likert scale. Data from 17 teachers on the shared meaning scale were discarded because these teachers belonged to teams that stated during the survey administration that they had not yet discussed the measures of the action plan. This made it impossible for them to answer the shared

meaning questions in a meaningful way. Then, we conducted a principal component analysis with a maximum likelihood extraction and a direct oblimin rotation, a subsequent second order confirmatory factor analysis, and finally we constructed a measurement model containing 8 scales and 41 items that had an acceptable fit, $\chi^2(761) = 1337.556$, $p < .000$, $RMSEA = .055$, $CFI = .901$, $SRMR = .064$. See Appendix A for an overview of the final composition of scales and items. Scales had good reliabilities, indicated by alphas of at least .7 (see Table 1). See Appendix B for an overview of the scale means, standard deviations, and the correlations between them.

To decide which variables are suitable to be analyzed at the team level, the intraclass correlation coefficients (ICC) 1 and 2 were computed. ICC(1) is a measure that indicates the extent to which the outcomes of members of the same team resemble each other. It is computed using the Bartko (1976) formula: $ICC(1) = (MSB - MSW) / (MSB + (k - 1) * MSW)$. *MSB* is the between-group mean square, *MSW* is the within-group mean square, and *k* is the (mean) group size. The Bartko formula is suitable in this case because the ICC(1) is calculated from an ANOVA model with team membership as a predictor. ICC(1) ranges from -1 to 1, where -1 means that there is no difference in group means ($MSB = 0$), but there is individual variance within the groups ($MSW > 0$), and where 1 means that all variance is explained by differences in group means ($MSB > 1$) and there is no individual variance within the groups ($MSW = 0$). There is no clear cut-off in literature that defines from what ICC(1) outcome the multilevel structure of the data should be taken into account. However, in educational research a common found minimum is an ICC(1) of 0.10 (Lodders, 2013, p. 41). ICC(2) is an indication of the reliability of the group means, which is computed with the Spearman-Brown prediction formula (Bartko, 1976; Bliese, 2000): $ICC(2) = (MSB - MSW) / MSB$. According to Bliese (2000) ICC(2) values equal to or larger than .5 are satisfactory, and values of at least .7 are considered to be good. Variables with an $ICC(1) > .1$ and an $ICC(2) > .5$ can be used on the team level. As can be seen in Table 1 it is necessary to administer a data analysis method that takes a multi-level structure into account, since there are several constructs with $ICC(1) > .1$ and $ICC(2) > .5$.

Table 1. Intraclass correlations and reliability of the variables

Variable	ICC(1)	ICC(2)	α
TL Vision sharing	.270	.778	.925
TL Stimulation	.350	.837	.903
TL Support	.312	.812	.912
Self-efficacy	.038	.271	.774
Collective-efficacy	.358	.843	.843
Individual IPR	.049	.330	.841
Collective IPR	.187	.689	.863
Shared meaning	.219	.669	.800

Analysis

The data was analyzed with Mplus statistical software version 6. We chose the two level random analysis type, which allows variation of intercepts and slopes between teams (see Preacher, Zhang, & Zyphur, 2010). The software program makes a distinction between variance due to individual differences and variance due to differences between teams. This distinction prevents biases like an underestimation of the standard errors (Preacher et al., 2010). When variables that are conceptually relevant at the between level (such as collective-efficacy) are measured at the individual level it is better to analyze them at both levels to reduce the chance of not finding significant effects (Preacher, Zhang, & Zyphur, 2010). However, the power of our sample did not allow us to do so if we also wanted to test all structural relations in the model. As such, to reduce the necessary degrees of freedom to fit our model, we aggregated three variables to the team level. Data aggregation is possible when it is theoretically relevant and justified by the ICC(1) and ICC(2).

Collective-efficacy, collective IPR, and shared meaning comprise the shared perceptions of team members about team characteristics, and are conceptually relevant only at the team level. They also had good ICC's, and were thus aggregated to the team level. Furthermore, because we expected the biggest effect of the TL variable vision sharing on the between level, only this TL dimension was analyzed at both the within and the between level. The other constructs were analyzed at the individual level.

Aggregating the three variables to the team level did not render sufficient power to test all structural relations in our model. To be complete we should include the relations among the three TL subscales. We have omitted them and focused on the hypothesized relations as displayed in Figure 2. This is justified because their close relationship is already well known from previous research. Because this may cause biased specification of the other relations in the model, results should be interpreted with caution.

To test the relationship between individual IPR and shared meaning in a meaningful way, we should have been able to model individual IPR on the team level, but the ICC's of individual IPR show that the degree to which the members of the team resemble each other is low ($ICC(1) = 0.049$), and the group mean is not reliable ($ICC(2) = .330$). As such, we were not able to model and test the relation between collective and individual IPR as specified in Figure 1, and to link the individual level to the dependent variable on the team level. Appendix B shows a correlation table which indicates that the variables are relatively independent from each other. Because there were too few degrees of freedom to compute the correlations between variables on the between level, all correlations were computed for the within level.

A multi-level path model was tested with structural equation modeling (SEM) to find out whether the data fits the specified hypotheses. The goodness of fit is reported by means of the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Standardized Root Mean Square Residual (SRMR). The fit of the model is found to be good when $RMSEA \leq .06$, $SRMR \leq .08$, and $CFI > .95$ (Thoonen et al., 2011). Nested models are compared with the Satorra-Bentler $\Delta \chi^2$ test ($\Delta \chi^2_{SB}$ test) and the standardized effect sizes of the relations in the model are reported.

Results

The structural model fitted well to the data ($RMSEA = 0.002$, $SRMR$ within = 0.000, $SRMR$ between = 0.038, and $CFI = 1.000$). Next, insignificant relations were removed based on the principle of parsimony resulting in the second model which also has a good fit ($RMSEA = 0.019$, $SRMR$ within = 0.014, $SRMR$ between = 0.086, and $CFI = 0.995$). The second model proved to fit the data as well as the first model ($\Delta \chi^2_{SB}(4) = 4.544$, $p = 0.337$). Therefore, we chose the second model over the first more complex model. Effect sizes are in Figure 2, direct and indirect effects are in Table 2¹.

¹ Due to the described problems with the degrees of freedom we were restrained in our possibilities to analyze the variables on the individual level in relation to the dependent variable shared meaning. Therefore we tried to exclusively analyze the relations on the between level with three combinations of TL: with only TL vision sharing, with a combined constructs of all three TL subscales, and with the three subscales of TL separately. No combination turned out to have a good fit which indicates that we need the whole model, including the variables on the within level to generate a good fit.

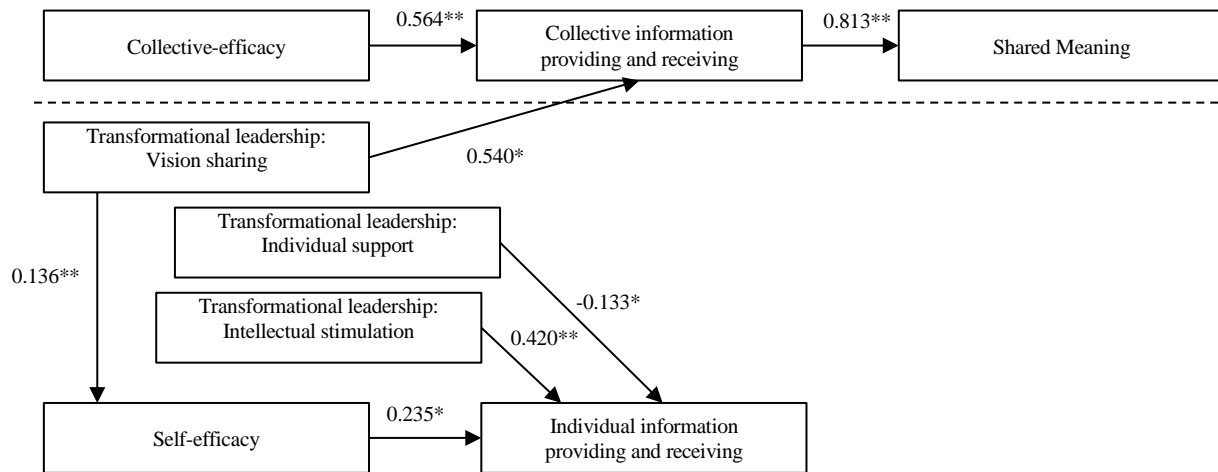


Figure 2. The effects of transformational leadership, efficacy and information proving and receiving on shared meaning. Note: *significant at $p < 0.05$, **significant at $p < 0.01$.

Table 2. Direct and indirect effects on professional learning and shared meaning.

Level		Shared meaning		Collective IPR	Individual IPR	
		direct	indirect	direct	direct	indirect
Team	Collective IPR	0.813				
	Collective-efficacy		0.458	0.564		
	TL Vision sharing		0.439	0.540		
Individual	TL Vision Sharing					n.s.
	TL Individual support				-0.133	
	TL Intellectual stimulation				0.420	
	Self-efficacy				0.235	

n.s. = not significant

Collective IPR had a large effect on shared meaning, confirming the first hypothesis. This implies that teams in which the flow of information between team members is established proficiently, there is more likely to be a shared meaning among team members on which collaborative action can be based. Such a large effect may indicate that the two constructs are the same. The correlation table in Appendix B however, shows that shared meaning and collective IPR are not significantly correlated.

It was not possible to test the second hypothesis which implies an effect of individual IPR on shared meaning mediated by collective IPR with the path model, because we were not able to analyze the relationship between individual IPR and collective IPR. Taking a closer look at the relation between individual and collective IPR using a different statistical technique, however, might show some insight after all. Figure 3 puts individual IPR against collective IPR in a scatter diagram. It shows that the distribution of individual IPR of team members decreases as collective IPR as a team property increases. When variability in scores for the dependent variable is not equal for all values of the independent variable the assumption of homoskedasticity is violated (Pallant, 2010). In other words, we are dealing with heteroskedasticity. Linear regression shows that there is a significant large standardized effect of collective IPR on the distribution of the scores of individual IPR within the teams (-0.558 , $p < 0.01$). This implies that teams in which collective IPR is higher, individual contributions to the flow of information are more balanced among team members.

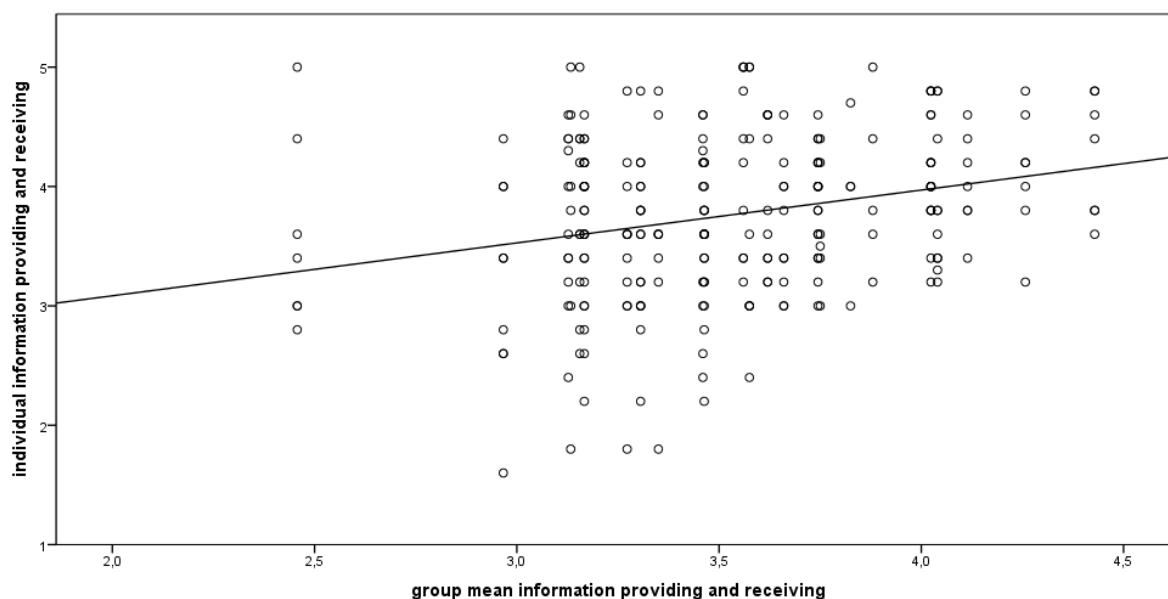


Figure 3. Relation between individual providing and receiving and the group mean information providing and receiving showing a heteroskedastic pattern.

Self-efficacy had a moderate effect on individual IPR. This implies that teachers who judge themselves as more competent, are more likely to provide others with information. Furthermore, a large effect appeared of collective-efficacy on collective IPR. This means that when the competence of the team is perceived to be higher, more information is shared within the team. Results also show a large indirect effect of collective-efficacy on shared meaning, which suggests that shared meaning can be improved, via collective IPR, by increasing the competence of the team, which confirms the third hypothesis.

TL individual support had a small negative effect on individual IPR. This means that the more teachers experience support for individual needs from their leader, the less they individually provide and receive information. This contradicts the fourth hypothesis which stated that the effect of TL individual support should be positive. TL intellectual stimulation however, had a large positive effect on individual IPR. This means that teachers that provide each other with knowledge to a greater extent, also experience more intellectual stimulation. In addition, TL vision sharing had a large effect on collective IPR, which implies that teams in which the leader gives direction to change by making clear what the goals of the organization are, IPR is higher than in teams in which the leader does not share a vision. Following these results TL had a positive effect on IPR with the exception of TL individual support. Therefore, the fourth hypothesis is partially confirmed.

TL vision sharing had a small effect on self-efficacy. We did not find significant effects of individual support and intellectual stimulation on self-efficacy. This suggests that considering TL behavior vision sharing plays a significant role in how competent teachers regard themselves. Remarkably, where we did find a small significant effect of TL vision sharing on self-efficacy, we did not find such an effect on collective-efficacy. Since we only found an effect of the TL vision sharing subscale on efficacy and only on the individual level, the fifth hypothesis which stated that TL has a positive effect on efficacy is partially confirmed.

We found a large indirect effect of TL vision sharing on shared meaning through collective IPR, indicating that collective IPR plays an important role in the relation between TL vision sharing and shared meaning. No indirect effect of TL vision sharing was found on IPR mediated by self-efficacy, suggesting that self-efficacy does not play a significant role in the relation between TL vision sharing and collective IPR.

Discussion

In this study we made an attempt to operationalize shared meaning among teachers as a precondition for educational change, and examined how factors that were found in earlier research to contribute to educational change contributed to shared meaning as well. This investigation was initiated by a VET college in the east of the Netherlands that had the desire to gain insight in educational change processes in teacher teams that are responsible for implementing educational reform proposed by the government. A sense making perspective was adopted to explain that action is based on gathered (non-consistent) information which is processed by team members individually as well as among team members (Weick et al., 2005). By means of the sense making perspective we were able to cover the interplay between psychological and contextual factors in relation to behavior associated with teacher change and shared meaning among teachers. The transformational leader (Geijsel et al., 1999) provides the initial information by sharing a vision that canalizes sense making processes, and support these processes by intellectually challenging the team members and by individually supporting them. This information processing, and subsequent acting, however, do not merely rely on the input provided by the leader, but are also affected by experiences from the past (Bandura, 1977; Weick et al., 2005). When team members jointly process the information (Weick et al., 2005), by at least providing each other with information (Spillane et al., 2012), they are able to form a shared meaning. In this way educational change and its associated actions to reach this change, can be formed in such a way that a coherent curriculum can be provided. The relations between TL, efficacy, IPR and shared meaning were investigated by testing a structural multi-level path model on two levels, using data from 250 teachers and 26 teams from a VET college in the East of the Netherlands.

Collective IPR had a large effect on shared meaning. For all team members to move in the same direction as a team, it is important that the flow of information runs fluently through the team. This is in line with the idea of Spillane et al. (2012) that colleagues have to provide each other with information so ties can be formed between team members, which can create a common base for action. When teachers provide each other with information they are able to discover inconsistencies and collaboratively make sense of it. The heteroskedastic pattern suggested that teams in which individual team members shared more knowledge with their team members and more equally to their team members had higher levels of collective IPR. This indicates that it is not sufficient when a few team members share their knowledge and others do not or to a limited extent. Contributions to the flow of information through the team have to be balanced among team members. This seems reasonable because each teacher has his or her own individual educational practice that only he or she can address. These results suggest that the collective IPR as a team property is a useful addition to the range of professional learning activities related to change, and is not simply the sum of IPR attempts of individual team members.

As expected a large effect appeared of collective-efficacy on collective IPR. This indicates that when the team is seen as more competent based on past experience, team members provide each other with information more. It can easily be imagined that team members are more likely to provide each other with information when they are confident that their team members can handle this information well and when they are confident that it leads to desirable action. This is an interesting complement to the findings of Jung and Sosik (2002) that group-efficacy is positively related to perceived group performance. TL vision sharing also had a large effect on collective IPR. This outcome replicates the findings of Geijsel et al. (1999) that TL vision sharing is positively related to learning activities. It can be explained by that when there is a clear vision, team members know what to talk about and share knowledge more easily with one another.

Unexpectedly we did not find an effect of TL vision sharing on collective-efficacy. Teams in which the leader shared a vision were not regarded as more competent than teams in which the leader did not. This contrasts findings from earlier research which suggests that when a vision is clearly identified by the leader, the personal and social identification of the subordinates is enhanced, which has a positive influence on collective cohesion (Sleegers, Thoonen, Oort, & Peetsma, Submitted). Collective IPR mediated the effects of TL vision sharing and collective-efficacy on shared meaning. This indicates shared meaning can be increased by enhancing its seedbed, collective IPR by TL vision.

Turning to the effects on the individual level, self-efficacy had a moderate effect on individual IPR. Individual teachers that felt more competent were more likely to share knowledge themselves. This

is in line with findings from earlier research that show positive relations between self-efficacy and persistence, less fear of failure (Runhaar, 2008), greater resilience (Yost, 2006), professional learning in the workplace (Geijsel et al., 2009), and challenging disconfirming information (Geijsel et al., 2009; Thoonen et al., 2011; van Woerkom, 2004). Not as expected, but not awkwardly strange either, TL individual support had a small negative effect on individual IPR. This can be explained by that those teachers that are in need of individual support, are more likely to experience a lack individual support and are more likely to give it a lower rate. TL intellectual stimulation had a large positive effect on individual IPR. Teachers that felt intellectually stimulated showed higher levels of individual IPR than teachers who did not. This replicates the findings of Dionne et al. (2003) that individual support empowers the team environment which has a positive effect on communication within teams. Through intellectual stimulation the teacher becomes more critical towards his own practice, and is more likely to find non-consistent information which can be made sense of and communicated with fellow team members. TL vision sharing had a small effect on self-efficacy. This is surprising because we did not find this effect on the team characteristic collective-efficacy, while vision sharing was predominantly defined as a part of the TL style that affects the team as a whole and not individuals in particular. A possible explanation is that individuals know where they stand when their leader shares a vision. People function suboptimal under uncertainty. A well communicated vision may take away this uncertainty and make the individuals feel more competent to act.

The outcomes demonstrate the importance of IPR as a team property to gain consensus among team members about the provided education. High levels of collective IPR can only be reached when team members equally contribute to the flow of information through the team. This flow of information can be enhanced when the team as a unit is considered to be proficient and when the leader shares a vision with the team that gives direction to change. In addition individual members are more likely to share knowledge with others when they consider themselves to be competent and can be encouraged to share knowledge when they are intellectually stimulated by the leader.

We found that both external input provided by the transformational leader and past experiences represented by efficacy heavily influence whether teachers provide each other with information. Next, teachers form a shared meaning based on this provided information and use it as a springboard for action. Sense making serves as the glue between those steps. The teachers make sense of the input from the leader and experiences stored in memory and provide informational output to colleagues. Then, the teachers collaboratively make sense of the information they have received from each other and create a common base for action, shared meaning. This shows that sense making is a useful perspective in the organizational change research area and helps explain how the different phases in change can take place.

Following the described relations above and the team result represented as means, we can carefully state that shared meaning of the teams of the VET institution under investigation potentially can be promoted by stimulating the flow of information within the teams. Improvements can be gained particularly on the area of sharing a vision that directs change and by promoting more equal knowledge sharing among teachers. It is suggested that more equal knowledge sharing among individuals can be promoted by challenging teachers to take a critical look at their own practices, opinions and values and to enter into dialogue about it with their colleagues. In other words, by intellectual stimulating them.

Limitations and future directions.

A first important remark that has to be made is that the sample size was relatively small. Because of this small sample size we were not able to analyze the data as we desired and we have to interpret the results with caution. Despite this shortcoming we were able to execute a multi-level analysis which, in contrast to much executed single-level analysis, does justice to the multi-level character of the investigated constructs.

In contrast to previous comparable research, the surveys were not administrated digitally but with paper and pencil during team meetings. This had a positive effect on the amount of subjects per team, because whether people took part in the investigation was not left to the personal interests of teachers in themes as handled in this investigation, interest in research in general, or to their planning. This means a reduction in self-selection bias by the teachers. When teachers were not present, this was due to practical issues like illness or planned activities elsewhere. Just a handful of teachers refused to

participate in the investigation based on fundamental objections. On the other hand, some form of self-selection may have occurred at the level of the team coordinator. They were informed that some of the questions were specifically about them. This could have discouraged them to participate with their team, especially because the teams were getting feedback on the outcomes.

During administration the team leader was present which might have influenced outcomes because teachers might be tended to give socially desirable answers, especially considering the questions about the team leader. Some teachers displayed a lack of faith in how discreet data was going to be handled by omitting questions about demographical information. This happened despite the fact that it was explicitly stated both verbally and written that personal information like age and gender were not going to be reported in such a way that answers could be traced back to individuals.

Another difficulty that appeared in the data gathering phase is that the teams were in different stages of implementing the educational changes as proposed by the government. Where teachers in some teams had to be informed yet, other teams had already implemented the changes. This might have affected the level of shared meaning that was reached. It might be interesting to develop a shared meaning scale that is independent from a specific change to avoid this situation, or to investigate shared meaning in a context in which the teams are more in sync.

Sense making is adopted as a perspective from which we explained the mechanisms between psychological and contextual factors in relation to behavior associated with teacher change and shared meaning among teachers. Hereby we made the optimistic assumption that when teachers make sense of a situation, they internalize it and create an idea of what to do to alter the situation in such a way it fits the desired state. Ketelaar, Beijaard, Boshuizen, and Den Brok (2012) however distinguish four types of sense making with their own mechanisms and which do not all have a positive outcome as assumed by the current investigation. Which type is relevant differs from person to person and can be determined by a semi-structured interview. It might be interesting to find out what factors contribute to more favorable types of sense making on the individual level, and to find out what these types of sense making mean on the team level.

Collective-efficacy and sharing a vision by the leader seem to be important factors for collective IPR. These factors, however, do not simply exist or non-exist. An important following up question is how we can promote leaders to share a vision and how to create higher levels of collective-efficacy within teams so that collective IPR resulting in a shared meaning can be enhanced. Considering the leader Bass (1999) describes various preconditions like organizational culture and proposes education and training guidelines to enable transformational leadership. These conditions may help developing a climate in VET organizations to promote transformational leadership.

Since efficacy is based on past experiences it seems logical that positive collective-efficacy can be promoted by positive team experiences. Zaccaro et al. (1995, in Jung & Sosik, 2002) argue that by changing the composition of a team, which leads to the improvement of team capabilities and higher team performances, can reinforce collective-efficacy. For the teacher teams within the VET organization under investigation this does not seem to be a plausible solution since the teams are pretty much fixed. A more suitable way to improve collective-efficacy might be to provide performance feedback on a regular basis (Jung & Sosik, 2003). Performance feedback on collective past behavior can help establish positive outcome expectancies towards specified collective future behavior. It can be interesting to find out how performance feedback and positive outcome expectancies of team behaviors can be promoted within teacher teams and whether they can supplement the outcomes as presented in the current investigation.

A final remark is that we measured shared meaning at one point in time and did not related it to actual change in practice. It is recommended to investigate the relation between shared meaning and actual practice in a longitudinal investigation. In addition, it was assumed that shared meaning among team members is a precondition for teachers to collaboratively provide a coherent curriculum for their students. This assumption can be tested by investigating the relation between shared meaning and perceived curriculum coherence of students.

Conclusion

We argued that shared meaning is an important condition for change in practice and related this concept to factors that were already known in educational reform. We found interesting and promising relations by using a multi-level approach that does justice to processes that take place on the team level. In addition a sense making perspective was adopted to cover the interplay between psychological and contextual factors in relation to behavior associated with teacher change and shared meaning among teachers. Overall findings from earlier research considering the effects of transformational leadership and efficacy on professional learning were replicated and supplemented with shared meaning. To conclude we can state that with this investigation we came one step closer in understanding educational reform.

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 Appendix A. Scales

Efficacy – Self-efficacy

- I can stay calm when I am confronted with difficulties during my job because I can rely on my skills
 - When I am confronted with a problem during my job, I usually find a solution
 - Whatever happens during my job, I can usually manage the situation
 - Experiences from the past have prepared me well for my current job
 - I reach the goals that I have set for myself
 - I am Sufficiently prepared to cope with the demands of my job
-

Efficacy – Group-efficacy

- My group can find solutions to problems with its performance
 - This group can pull itself out of a slump
 - I believe that failure will make our group try harder
 - My group members go above and beyond the call of duty
-

Transformational leadership – Vision sharing

My team coordinator...

- uses all possible occasions to share the vision of the MBO College to the team, students, parents, and others
 - refers during decision making processes explicitly to the goals of the MBO College
 - clarifies for the team the relation between the vision of the MBO College and initiatives from the board of directors
 - describes from a vision for the future of the MBO College in a clear way the current problems
 - sketches during meetings the consequences of the vision for the MBO College's current ins and outs
-

Transformational leadership – Individual support

My team coordinator...

- takes the opinions of individual teachers seriously
 - shows appreciation when a teacher takes initiative for educational improvement
 - listens carefully to ideas of team members
 - has an eye and an ear for problems teachers experience during policy implementation
 - helps teachers to express their emotions
-

Transformational leadership – Intellectual stimulation

My team coordinator...

- encourages teachers to try new things in line with their own interests
 - encourages teachers to think about how practices of the MBO College can be improved
 - encourages teachers to seek and discuss new information and ideas that are relevant to the direction in which the MBO College is developing
 - engages individual teachers in ongoing discussion about their personal professional goals
 - encourages teachers to experiment with new teaching methods
 - my superiors create opportunities for teachers to develop professionally.
-

Professional learning – Individual Information providing and receiving (knowledge sharing)

- I share my knowledge and experience regularly with my team members
 - I discuss with my team members what I find important in my work
 - I discuss with my team members our criteria for good functioning
 - I discuss problems in my teaching practice with others to learn from that
 - I discuss with my team members how I developed
 - I think about the communication with my team members
-

Professional learning – Collective Information providing and receiving

- We in our team provide each other with feedback on our teaching practices
 - We in our team share the difficulties that we encounter and how we solve them
 - We in our team share our learning experiences with each other
 - We in our team share our knowledge and experiences with each other on a regular basis
 - We in our team are free to give each other some advice
-

Shared meaning

- The members of our team agree upon how we are going to intensify the curriculum
 - The members of our team agree upon the use of intensifying the curriculum
 - The members of our team are equally prepared to intensify the curriculum
 - The members of our team equally support the intensification measure
-

Appendix B.

Correlations, means and standard deviations

	M	SD	1	2	3	4	5	6	7
1. TL vision	3.50	.849							
2. TL support	3.78	.846	.357*						
3. TL stimulation	3.65	.813	.441°	.467°					
4. Self-efficacy	4.14	.512	.057*	.044*	.061*				
5. Collective-efficacy	3.84	.710	.367°	.343*	.394°	.081*			
6. Individual IPR	3.84	.647	.151*	.096*	.181*	.057*	.224*		
7. Collective IPR	3.52	.788	.280*	.212*	.272*	.042*	.371°	.235*	
8. Shared meaning	3.20	.881	.248°	.149°	.210°	.030*	.243°	.086*	.119°

°Significant at the .1 level

*Significant at the .05 level

Appendix C. Syntax

```

Title:
structural multilevel model.

Data:
FILE IS C:\specify file;

Variable:
NAMES ARE
JSE1 JSE2 JSE3 JSE4 JSE5 JSE6
CE1 CE2 CE3 CE4 CE5
TLvisi1 TLvisi2 TLvisi3 TLvisi4 TLvisi5
TLsupp1 TLsupp2 TLsupp3 TLsupp4 TLsupp5
TLstim1 TLstim2 TLstim3 TLstim4 TLstim5 TLstim6
REFL1 REFL2 REFL3 REFL4 REFL5 REFL6
iKNOWSH1 iKNOWSH2 iKNOWSH3 iKNOWSH4 iKNOWSH5
cKNOWSH1 cKNOWSH2 cKNOWSH3 cKNOWSH4 cKNOWSH5
FEEDt1 FEEDt2 FEEDt3 FEEDt4
FEEDm1 FEEDm2 FEEDm3 FEEDm4
SHMSH1 SHMSH2 SHMSH3 SHMSH4 SHMSH5 SHMSH6
SHMIN1 SHMIN2 SHMIN3 SHMIN4 SHMIN5 SHMIN6
POLINFO1 POLINFO2 POLINFO3
function timework jobsize educat gender age
teamnr pprnr
;

USEVARIABLES

teamnr

TLvisi
TLsupp
TLstim
SE
iKNOWSH

CEML
cKNOWML
SHMML
;

MISSING ARE ALL ( 9999 );

WITHIN ARE
TLsupp
TLstim
SE
iknowsh
;

BETWEEN ARE
CEML
cKNOWML
SHMML
;

CLUSTER = teamnr;

Define:

TLvisi = MEAN (TLvisi1 TLvisi2 TLvisi3 TLvisi4 TLvisi5);
TLsupp = MEAN (TLsupp1 TLsupp2 TLsupp3 TLsupp4 TLsupp5);
TLstim = MEAN (TLstim1 TLstim2 TLstim3 TLstim4 TLstim5 TLstim6);

SE = MEAN (JSE1 JSE2 JSE3 JSE4 JSE5 JSE6);
CE = MEAN (CE1 CE2 CE3 CE4);

```

```
iKNOWSH = MEAN (iKNOWSH1 iKNOWSH2 iKNOWSH3 iKNOWSH4 iKNOWSH5 REFL5);
cKNOWSH = MEAN (cKNOWSH1 cKNOWSH2 cKNOWSH3 cKNOWSH4 cKNOWSH5);
```

```
SHM = MEAN (SHMIN1 SHMIN2 SHMIN3 SHMIN4);
```

```
CEML = CLUSTER_MEAN (CE);
cKNOWML = CLUSTER_MEAN (cKNOWSH);
SHMML = CLUSTER_MEAN(SHM);
```

```
Analysis:
TYPE = TWOLEVEL RANDOM;
```

```
! -----
```

```
Model:
```

```
%within%
iKNOWSH ON SE(d);
```

```
iKNOWSH ON TLsupp;
iKNOWSH ON TLstim;
```

```
SE ON TLvisi(e);
```

```
!!!Non-significant deleted from first model
!iKNOWSH ON TLvisi;
!SE ON TLsupp;
!SE ON TLstim;
```

```
%between%
CEML cKNOWML SHMML ;
```

```
SHMML ON cKNOWML(c);
cKNOWML ON CEML(a);
cKNOWML ON TLvisi(b);
```

```
!!!!Non-significant deleted from first model
!CEML ON TLvisi;
```

```
!!!Remove if you want modindices
```

```
MODEL CONSTRAINT:
```

```
NEW(ac);
ac=a*c;
NEW(bc);
bc=b*c;
NEW(de);
de=d*e;
```

```
output:
!modindices (all);
```