

MACIEJ KARWOWSKI

## **The Creative Mix? Teacher's Creative Leadership School Creative Climate and Students' Creative Self-Efficacy<sup>1</sup>**

**„Twórczy mix?” Twórcze przywództwo nauczyciela, twórczy klimat szkoły i twórcza samoskuteczność uczniów**

**Abstrakt:** Badania prezentowane w artykule podejmują problem relacji między zachowaniami nauczyciela a twórczą samoskutecznością uczniów. Główna hipoteza zakłada, że twórcze (transformatywne) zachowania nauczyciela pośrednio wpływają na twórczą samoskuteczność uczniów. Czynnikami pośredniczącymi w tej relacji (mediatorami) są motywacja samoistna uczniów i relacje interpersonalne panujące w klasie. Badania przeprowadzone na uczniach polskich szkół średnich ( $N = 435$ ) z wykorzystaniem różnych metod i strategii analitycznych (wielokrotna analiza mediacyjna, analiza ścieżek) potwierdziły sformułowaną hipotezę. Rezultaty są dyskutowane w świetle możliwości ich przełożenia na praktyki edukacyjne.

**Słowa kluczowe:** twórcza samoskuteczność, nauczycielskie przewodzenie, motywacja samoistna, klimat dla kreatywności

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## Introduction

Overall successes in school, work and life are caused by countless numbers of factors, and explored by different scientific disciplines. Among many conclusions drawn from the research conducted by educational psychologists, the role of self-efficacy is worth highlighting. Bandura's works (1977, 1986, 1993) showed that the efficiency of students' functioning depends not only on the level of abilities, but also on perceived self-efficacy, namely an individual's conviction that he or she is able to cope with problems. Numerous studies (see Bandura, 1997 for a review) confirmed that students with the same level of abilities behave at different efficiency levels. The reason for it often lies in their perceived self-efficacy. A more recent work of Bandura (1997) elaborated the concept of overall self-efficacy and turned its detailed characteristic into specific self-efficacies, also in the area of creativity. The assumption is that to solve problems creatively an individual must not only have creative abilities but also be characterized by a certain level of creative self-efficacy. The important question is what influences such creative self-efficacy, and especially which teachers' behaviors may stimulate it and how. The aim of this study is to show relations between teachers' behaviors typical for transformational leadership and students' self-efficacy. The study was conducted in order to deepen our knowledge of the possible antecedents of creative self-efficacy in the classroom. Teachers' transformational leadership is treated as a main independent variable which strengthens students' confidence in their own creativity. However, the complexity of teacher-student relationship in the classroom suggests that there are many possible mediators of the relationships between teachers' behaviors and students' creative self-efficacy. In this study two possible mediators were tested. The first one is students' intrinsic motivation which is assumed to be influenced by teachers' transformational leadership and which then translates into higher creative self-efficacy. The second mediator is the interpersonal climate in the classroom, understood as trust between students and teachers. It is expected that higher trust level may be caused by teachers' transformational leadership and it may then render higher creative self-efficacy among students more likely.

## Creative Self-Efficacy

Creative self-efficacy may be defined as one's belief in one's own competence in the area of creativity. Such efficacy may be analyzed further and in more detail among different domains of creativity, but also at a more general level, such as a belief that an individual has enough abilities to solve problems creatively, is able to find new ways of developing ideas or possesses any talents and abilities which make creative efforts possible. Studies conducted by creativity scholars concentrate on different aspects of creative self-efficacy. Beghetto (2006) analyzed school- and class-level correlates, along with the relations between individual creative styles. Tierney (1997) studied cognitive climate and creative self-efficacy. Karwowski (2009a) concentrated on an accuracy of creative self-efficacy and its individual and social antecedents. Finally, Jaussi, Randel & Dionne (2007) demonstrated the relations between creative self-efficacy and creative personal identity, and Tierney & Farmer (2002) showed influence of creative self-efficacy on work performance.

Beghetto (2006) identified a set of important correlates of self-efficacy among middle and secondary students. He showed that school climate is positively related to creative self-efficacy as well as mastery goals in the classroom. At the same time, creative self-efficacy correlated positively with SES and was higher among males than females.

Tierney (1997) analyzed the relations between creative self-efficacy and creative styles. The author found positive relations between innovativeness as defined in the Kirton (1976) model and creative self-efficacy. Also, the relations between team climate and creative self-efficacy were significant and positive. Cognitive climate was operationalized there as an averaged cognitive style of team members.

Jaussi, Randel & Dionne (2007) made the distinction between creative self-efficacy and personal creative identity. In their conception, although both concepts are significantly related to each other, they are also different in connotation. Creative self-efficacy describes overall belief about one's efficiency in solving creative problems and behaving creatively, whereas creative personal identity is also connected with the issue of how much creativity is valued and to what extent it is treated as an important part of an individual's identity. Both characteristics were significantly correlated, and both were explaining the variance of effective functioning in work environment beyond the second predictor.

A study which revealed moderating effects of self-efficacy was realized by Baer, Oldham, Jacobson & Hollingshead (Baer et al., 2008). The authors showed that when explaining creative efficacy of groups it

is worth to analyze personality of team members and collective creative self-efficacy together. In the groups with higher number of extravert members or people open to experience, creative functioning improves, moderated by the strength of the perceived collective self-efficacy, defined as a conviction that groups are more creative than individuals.

A study of group functioning was also developed by Mathisen and Bronnick (2009) who analyzed the effects of creativity training on creative self-efficacy and found that creativity training may improve creative self-efficacy of participants.

Serious questions in the studies of creative self-efficacy are connected with possibilities of its development in school and classroom settings. The role of the teacher and/or properties of the school climate for students' creative self-efficacy are examples of educationally sound research problems in creativity studies.

## Teacher as a Tranformative Leader

Transformative leadership is usually understood as a style which "emphasizes collective action and moral and intellectual development, implicates self-concept of followers to work beyond expected levels of performance typically associated with *transactional contingent reward leadership*, which emphasizes goal setting and the provision of rewards when expected levels of performance have been achieved" (Sosik, Kahai, Avolio, 1999, pp. 228—229).

Studies into transformational leadership usually confirm the positive role of this style for creative functioning. Research conducted in different settings, on different groups of participants, and with the use of different methods, generally brings one to similar conclusions. Jung (2000—2001) or Sosik, Kahai & Avolio (1998) reveal a positive influence of transformational leadership on followers' creativity. Despite separate studies (Sosik, Kahai, Avolio, 1999), great majority confirms a positive role of transformational leadership for creativity as well as an inhibiting influence of transactional style of leadership on creative behavior.

The concept of transformational and transactional leadership is rarely applied into school settings and into analyses of teacher behaviors. However, in the latest research (Bezzina, Michalak, 2006; Karwowski, 2010), this concept is also used in an analysis of teacher behaviors. In Karwowski's (2010) study, a Short Scale of Teacher Leadership (SSTL) was developed. This scale measures the intensity of transformational

leadership of the teachers. It is developed to be used by students to describe their teachers as well as for the teachers to evaluate themselves. The scale is composed of ten items, has one-factor structure and is highly reliable ( $\alpha = .90$ ). In the second study presented in Karwowski's paper, the author concluded that the intensity of transformational leadership behaviors is a significant predictor of two of the three dimensions of the climate for creativity (Karwowski, 2009b): interpersonal (trust) and task (task freedom). The third study showed that the intensity of transformational leadership is a significant predictor of a team's successes, but in interactions with a leader's creativity understood both as a level and style. Effectiveness of a team's functioning increased with transformational leadership, but only in case of the most creative leaders.

In another study, Karwowski (2009d) showed the relations between teachers' leadership styles and students' intrinsic motivations. Teachers with strong transformational leadership characteristics developed their students' intrinsic motivation more efficiently. Further analyses showed significant mediation effects: teachers' transformational leadership influenced students' intrinsic motivation via the climate for creativity. Both direct and indirect effects were significant, which shows a substantial effect of a teacher's leadership on students' intrinsic motivation and its influences mediated by the climate for creativity.

Although assumption that transformational leadership might affect creativity indirectly by influence on intrinsic motivation and climate seems somehow intuitive, there is confirmation of this line of reasoning in existing research. As Bass & Riggio (2006, p. 54) noted:

Research by Jung, Chow, and Wu (2003) suggests how transformational leadership might affect creativity. First, transformational leaders increase followers' intrinsic motivation (as opposed to the transactional leaders' emphasis on extrinsic motivation), which stimulates creativity (see also Shin & Zhou, 2003). Second, the intellectually stimulating transformational leader encourages followers to think "outside of the box" (see also Elkins & Keller, 2003).

This results show that transformational leaders primarily encourage follower creativity and innovation by providing a climate that supports followers' innovative efforts.

## Intrinsic Motivation

Intrinsic motivation is probably one of the most extensively studied antecedents of creativity. Among the different approaches to the studies of intrinsic relations between motivation and creativity, Amabile's et al. (Amabile, 1982; Amabile et al., 1996) studies seems to be known best. In dozens of experiments on the influence of intrinsic and extrinsic motivation on creativity, Amabile et al. proved positive influence of intrinsic motivation and a hindering role of extrinsic motivation on creativity. It was found that competition as well as expectancy of assessment or rewards decrease intrinsic motivation, hence negatively influencing creativity. Those findings are in line with a classic experiment of Kruglanski, Friedman & Zeevi (1971) who discussed the results in line with the cognitive dissonance theory. Sometimes in contemporary studies of the relationship between motivation and creativity, contrasting results and interpretations may also be found. Eisenberger's studies (i.e. Eisenberger, Shanock, 2003) reveal that rewards are not necessarily detrimental for creativity; under certain circumstances they may even relate to creativity positively. Eisenberger's argumentation is as follows: participants in a typical Amabile (i.e. 1982) experiment are asked to produce something: the control group is just asked to draw something, write a haiku or perform a different activity. Additional promise of reward exists in the experimental group. However, in Eisenberger's interpretation, the fact that the group which was promised a reward achieved less creative results is caused by a misunderstanding of the participants as to what is going to be evaluated. Children think about something that will be accepted by their teachers and because school promotes algorithmic solutions, they create such products. If they knew that creativity is required, their products would be much more creative, Eisenberger and Shanock (2003) argue. As a matter of fact, results from Amabile's experimental groups are generally rated higher in aesthetic or technical values, which fact confirms Eisenberger's reasoning. Hennessey & Amabile's (1998) answer to those critics rejects this point, arguing that many times in their experiments participants were asked to be creative, and the profile of the results did not change.

There is a visibly smaller number of works where relations between creativity and motivation treated as orientation are studied. In Amabile et al. (1994) paper, significant relations between intrinsic motivation and different measures of creativity exist. It was found that people motivated intrinsically are more innovative, whereas people motivated extrinsically are more adaptative. Cumming, Hall, Harwood & Gammage (Cum-

ming et al., 2002) showed that young swimmers who are characterized by a balance between intrinsic and extrinsic motivation are most open to using their imagination.

Prabhu, Sutton & Sauser (2008) proposed and empirically confirmed that intrinsic motivation may be treated as a significant mediator of relations between certain personality traits and creativity, and extrinsic motivation as a moderator of those relations. It was also shown that intrinsic motivation was significantly and positively correlated with openness to experience, an individual's self-efficacy and with perseverance. Extrinsic motivation was significantly and negatively connected with openness, hence revealing higher level of rigidity among extrinsically motivated people.

Karwowski & Gralewski (in press) developed and empirically tested the hypothesis of motivational synergy formulated by Amabile (1993). They found significant interactional influence of both motivational orientations (intrinsic and extrinsic) on factors which contribute to such creative attitudes in the model of Popek (2001) model as nonconformity and heuristic behaviors. It was found that those creative characteristics tend to increase with extrinsic motivation but only if intrinsic motivation is high. Although the study was cross-sectional and the authors called for experimental and longitudinal research, the latter demonstrates significant consequences for the education of creativity, namely development of intrinsic and extrinsic motivational orientations as an effective way to fulfill one's creative potential.

## Creative Climate

Creative climate is differently understood and operationalized in many theories (see for example Amabile et al., 1996; Anderson, West, 1998; Ekvall, 1996).

In Karwowski's (2009b) model, the climate for creativity is understood as beliefs and opinions about workplace or school shared by workers or students. They mainly describe interpersonal relations and conditions (interpersonal component) as well as effectiveness of task realization (task component). There are three main elements in the model: interpersonal, task, and energetic. The interpersonal area describes the relations between people in a school or organization, and is characterized by overall warmth between people in the organization. Trust scale is a measure of this component.

Task area is understood as a practical influence of participants on choice and ways of realizing tasks. Task freedom scale is developed to measure this component. The third element of the model — the energy level — describes the dynamism of the system, its static versus changing character and risk and uncertainty scale was developed to measure this component.

Recent study on climate-creativity relations developed on student samples (Karwowski, 2009c) has revealed curvilinear relationships, which fact indicates that creativity requires a kind of “golden mean,” and may be effectively enhanced in a non-greenhouse atmosphere.

The assumed relations among the three components of the model, namely interpersonal, task and energetic components are highly interactive — meaning that the various configurations of each could bear creative effects. It is possible to expect creativity where a high level of interpersonal coherence is accompanied by high task-related coherence, and entirety of all mechanisms is additionally fuelled by positive energy. Conflicts, if they appear at all, are rather of task-related than interpersonal character. However, due to the equifinality known as characteristics of complex systems (Gresov, Drazin, 1997), other coincidences of elements may also be fruitful for creativity.

## Theory and Hypotheses

Based on the presented research overview, the question of possible relations between discussed variables arises. There are at least three possible patterns of relations between them. Firstly, it may be assumed that both classroom climate and students' intrinsic motivation will work as mediators between teachers' leadership and students' creative self-efficacy. Such relationships are presented in Figure 1 (Model 1a) and may be analyzed with the use of both multiple mediator analysis (Preacher, Hayes, 2008) and path analysis. The first model is treated as a baseline, to which the two consecutive models described below are compared. It is reasonable to think that the teacher's transformational leadership will positively influence the climate in the classroom, especially its interpersonal component. Therefore, basing on previous discussions it is assumed that:

**H1.** Teacher leadership will influence students' creative self-efficacy, but mediation of class climate is expected. A teacher's transformational leadership will positively influence the level of trust in the classroom, which will influence students' creative self-efficacy.

Although this hypothesis lacks strong support in existing research and may be treated as intuitive, there are indirect arguments in favor of such expectations. Descriptions of transformational leaders (Bass, Riggio, 2006) highlight their insistence on commitment, loyalty and satisfaction of followers (Bass, Riggio, 2006, pp. 32—47) and also on possibilities of transformational leadership to be helpful in reducing stress in teams and organizations (Bass, Riggio, 2006, p. 77). Although there are no comparable studies in education it may be expected that the pattern of relationship will be quite similar, and transformational behavior of the teacher will make classroom climate more trustful.

Analyzing the data presented in Karwowski's (2009d) research it is also hypothesized that:

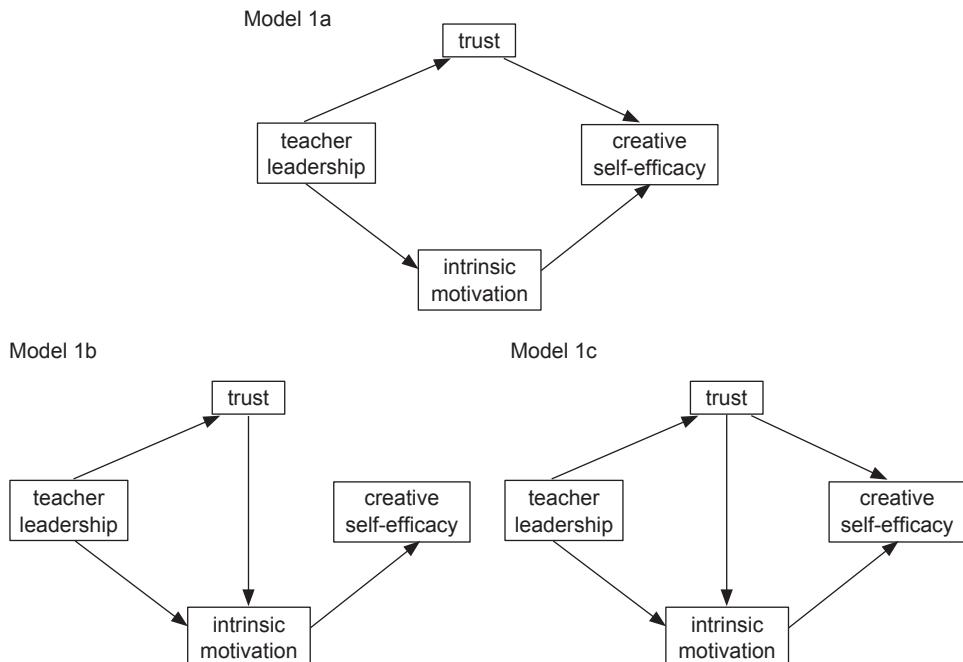


Fig. 1. Hypothetical models of the relations between teacher leadership, creative climate, intrinsic motivation and creative self-efficacy

**H2.** Intrinsic motivation will mediate the influence of teachers' transformational leadership on students' creative self-efficacy.

Basing on the findings of Karwowski, it was decided to check whether the climate for creativity influences the students' intrinsic motivation. In such style of relations, the tested model will look similarly to those pre-

sented in Figure 1 as Model 1b. It was verified with the use of structural equation modeling. Another hypothesis was formulated:

**H3.** The level of interpersonal trust in the classroom will positively influence students' intrinsic motivation.

Last but not least, one additional model was included in the analyses. In this model, mediated by intrinsic and direct motivation, we tested paths from creative climate to students' creative self-efficacy. This model is presented in Figure 1 as Model 1c.

## Method

### Participants

Participants were students from Polish middle and high schools ( $N = 435$ ); among them, 40% were male and 60% were female. Participants' age ranged from 13 to 19 years with  $M = 15.8$  and  $SD = 1.87$ .

### Measures

**Teachers' Transformational Leadership.** Teachers' transformational leadership was measured with the use of Short Scale of Teacher Leadership (SSTL; Karwowski, 2010). This scale consists of ten items, it has a single-factor structure and is characterized by high overall reliability, with  $\alpha = .87$ . It was developed to assess the level of teachers' transformational leadership as perceived by the students.

**School and Class Creative Climate.** School Creative Climate Questionnaire (SCCQ) was used to measure creative climate. SCCQ is a 44-item, paper-and-pencil questionnaire with 5-point Likert-type scale (ranging from "definitely not" to "definitely yes"). It measures three main components of classroom and school atmosphere, as per Karwowski's (2009a) model. The creative climate is understood there as consisting of three components: interpersonal (measured by trust scale), task (measured by task freedom scale) and dynamism (measured by risk and uncertainty scale). In the presented research, scales were characterized by acceptable to good reliabilities: trust  $\alpha = .70$ , task freedom  $\alpha = .91$  and uncertainty  $\alpha = .64$ . In this study, only the trust scale was used in further analyses.

**Motivational Orientations.** Revised Polish version of Amabile et al. (1994) Work Preference Inventory, developed by Karwowski (2009d,

2010), was used. The first order structure of the scales is nearly the same as in the original version of the instrument, yet the second-order factor structure differs. In Karwowski's study, conducted during exploratory and confirmatory factor analyses, it was proposed that the intrinsic motivation scale consists of three second-order scales called "flow," "internal motivators" and "challenge." Extrinsic motivation consists of "goal formulation," "goal clarity" and "external motivators." The two first-order scales in this study are characterized by acceptable reliability, intrinsic motivation  $\alpha = .69$  and extrinsic motivation  $\alpha = .64$ . Only those scales were used in further analyses.

**Creative Self-Efficacy.** Three items measured on the 5-point ("definitely not" — "definitely yes") Likert-type scale were used to assess students' creative self-efficacy ( $\alpha = .78$ ), intended to measure students' self-perceived abilities to function creatively. The items were (a) "I think I am creative," (b) "I would describe myself as a talented person," (c) "I am gifted enough to manage problems."

## Results

**Descriptive statistics and intercorrelations.** Presentation of means, standard deviation and zero-order, and Pearson's intercorrelations between variables were compounded in Table 1. As it may be found, creative self-efficacy was significantly correlated with the level of trust in the classroom as well as with intrinsic motivation. In the former, the strength of relationships is weak, in the latter — it is substantial. Creative self-efficacy is marginally significantly related to extrinsic motivation but not to teachers' transformational leadership.

Table 1  
Descriptive statistics and intercorrelations between variables

Variables in the study	M	SD	1	2	3	4	5
Creative self-efficacy	10.96	2.50	(.78)	.03	.14 <sup>c</sup>	.28 <sup>d</sup>	.09 <sup>a</sup>
Teacher leadership	31.16	10.25		(.87)	.56 <sup>d</sup>	.13 <sup>c</sup>	.05
SCCQ Trust	34.58	6.60			(.70)	.16 <sup>d</sup>	.10 <sup>b</sup>
Intrinsic motivation	40.30	5.41				(.69)	.24 <sup>d</sup>
Extrinsic motivation	40.16	5.36					(.64)

<sup>a</sup>  $p < .10$ ; <sup>b</sup>  $p < .05$ ; <sup>c</sup>  $p < .001$ ; <sup>d</sup>  $p < .0001$ .

Cronbach's  $\alpha$  in parentheses on the diagonal.

Teacher leadership is strongly related to the trust scale of creative climate, and marginally to students' intrinsic motivation. Trust in school and classroom is related to both intrinsic and extrinsic motivational orientations.

Further analyses, developed to verify the formulated hypotheses were conducted with the use of two different methods. To verify H1 and H2, both multiple mediators and path analyses were provided.

**Multiple Mediator Analyses.** The first two hypotheses assumed indirect relations between the perceived teachers' leadership style and students' creative self-efficacy. In relation with H1, classroom climate is hypothesized to be the first mediator of this indirect relation as well as of an intrinsic motivation, which was stated in H2. Multiple-mediator model explained 9 percent of the variance of students' creative self-efficacy. Both mediating effects were statistically significant, in case of intrinsic motivation Sobel's  $z = 2.18$ ,  $p = .003$ , and  $z = 2.47$ ,  $p = .01$  for trust. Those findings confirm H1 and H2. Teacher transformational leadership has no direct influence on students' creative self-efficacy. Illustration of the relations is presented in Figure 2.

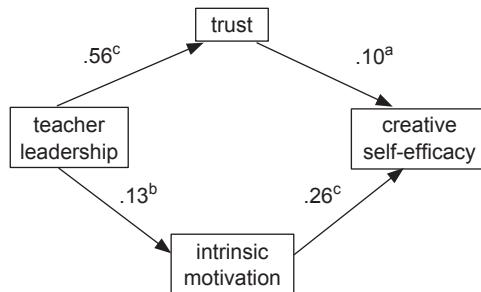


Fig. 2. Empirical baseline model with trust and intrinsic motivation as mediators  
<sup>a</sup>  $p < .05$ ; <sup>b</sup>  $p < .01$ ; <sup>c</sup>  $p < .001$ .

## Path Models

As stated in the hypotheses section, development of three alternative models was taken into consideration. The first model fully overlapped with multiple-mediator analysis and was treated as a baseline. The second model also consisted of a path from trust to intrinsic motivation and the third one included assessment of the relations from trust to creative self-efficacy both directly and indirectly via intrinsic motivation. The path coefficients are presented in Figures 2—4, and Table 2 summarizes model properties and fits.

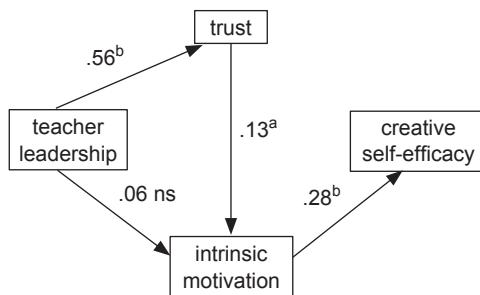


Fig. 3. Alternative empirical model with the path from creative climate to intrinsic motivation

ns — non significant; <sup>a</sup>  $p < .05$ ; <sup>b</sup>  $p < .01$ .

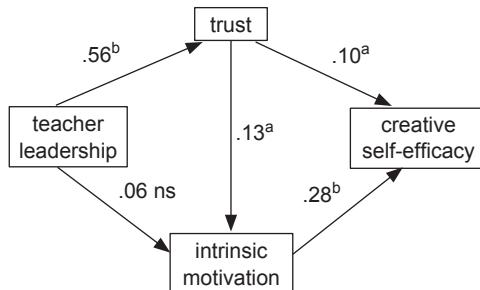


Fig. 4. Alternative empirical model with direct and indirect relations between creative climate and creative self-efficacy

ns — non significant; <sup>a</sup>  $p < .05$ ; <sup>b</sup>  $p < .01$ .

Table 2  
Indexes of fit of three paths models

Model	$\chi^2$	Cmin/df	NFI	CFI	RMSEA
1a	$\chi^2(2) = 7.56; p = .02$	3.78	.96	.97	.08
1b	$\chi^2(2) = 6.29; p = .04$	3.14	.97	.98	.07
1c	$\chi^2(1) = 2.17; p = .14$	2.17	.99	.99	.05

All three models fit data well and the differences between them are marginal. Significant path coefficient from trust to intrinsic motivation presented in Figure 3 confirms H3, yet lack of the significance of the path from teachers' leadership to students' intrinsic motivation partially opposes H1. This finding suggests that teachers' leadership influences students' intrinsic motivation indirectly rather than directly.

Four fit indexes were used to assess the quality of models: Normed Fit Index (NFI) and Comparative Fit Index (CFI) as well as chi square/

degrees of freedom ratio and Root Mean Square Error of Approximation (RMSEA). In all cases, the rule of thumb criteria are found. The first model is characterized by acceptable NFI and CFI values as well as the RMSEA value. The  $\chi^2/df$  ratio is slightly higher than the recommended boundary value of 3.00, and the  $\chi^2$  value is significant, but in fact this model finds its confirmation.

The second model, which also includes causal path from trust (an interpersonal component of creative climate) to the intrinsic motivation, fits slightly better: both fit indexes grow, root error decreases, and  $C_{min}/df$  value is close to recommended, yet the  $\chi^2$  value is still significant. The last model is characterized by an almost perfect fit, achieving fit indexes close to perfect 1, low RMSEA, non-significant  $\chi^2$  value and  $\chi^2/df$  ratio below 3.

The first model, which includes multiple mediators of the relationship between teachers' transformational leadership and students' creative self-efficacy, shows that leadership behaviors are about four times more impactful on trust in the classroom than on students' intrinsic motivation. The paths from those two mediators to creative self-efficacy show contrary results — intrinsic motivation has a twice stronger influence on the dependent variable than does trust among students in the classroom.

As it shows in case of the second model, the path from interpersonal trust to intrinsic motivation is significant but weak, and direct paths from teachers' leadership to students' intrinsic motivation disappear. This finding is an argument for the mediating role of climate in the relationship between teachers' activity and students' creative self-efficacy. Similarly, as in Karwowski's (2009c, 2009d) study, it was shown that students' intrinsic motivation may be indirectly caused by teachers themselves, by improving interpersonal trust. Yet contrary to previous findings the direct path was not proved significant. The path coefficient from intrinsic motivation to creative self-efficacy is slightly higher than in case of the previous model.

The third model, with both indirect (via intrinsic motivation) and direct paths from trust to creative self-efficacy shows that both paths are significant, yet the direct path is almost three times weaker than that from intrinsic motivation to creative self-efficacy.

## Discussion

How can teachers be helpful in developing students' creative self-efficacy? This study suggests that there are at least some contributions teachers could make to strengthen young people's beliefs in their creative abilities. Three models with different patterns of relationship were assessed. The first hypothesis was initially confirmed by multiple mediator analysis and path analysis. Teachers' transformational leadership influenced students' creative self-efficacy indirectly by interpersonal relations in the classroom as well as by students' intrinsic motivation. However, values of standardized path coefficients are worth attention and mentioning. It may be concluded that teachers' possibilities to influence the climate in the classroom are about four times greater than possibilities for influencing intrinsic motivation. This finding is not very surprising assuming that intrinsic motivation was understood as a stable motivational orientation, closer to classic definition of a trait than a state (see Amabile et al., 1994 for a discussion).

The second formulated hypothesis also assumed influence of creative climate on students' intrinsic motivation, following earlier research (Karwowski, 2009c, 2009d). The structural model confirmed this assumption, yet simultaneously, the positive relationship between teacher leadership and intrinsic motivation observed earlier, disappeared. This result suggests that climate is a mediator of relations between teachers' behavior and students' intrinsic motivation, revealing possibilities of developing students' intrinsic motivation by improving the level of trust in the classroom. Such a result makes the first hypothesis more doubtful. It was proved that teacher behavior which is perceived as typical for transformational leader's influences interpersonal relations in the classroom, which translates into higher intrinsic motivation that, in turn, also strengthens creative self-efficacy. This model is more empirically valid than the first one and is also characterized by a better fit. The third model also supports the more elaborated relationship structure: trust in the classroom influences students' creative self-efficacy both directly and indirectly via their intrinsic motivation.

Overall, the results demonstrate that teachers' role in improving students' self-efficacy is an important one and should translate into more applied conclusions. Transformational leadership in teaching may even be understood as part of creative teaching. As Grainger, Barnes & Scoffham (2004, p. 245) pointed out, "questioning & challenging" and "representing ideas in a variety of ways" are characteristics of creative teaching, and at the same time of teachers' transformational leader-

ship behaviors. The title of Anderson's (2002) paper suggests creative teaching to be a mix of risk, responsibility and love, in line with many definitions of transformational leadership (Jung, 2000—2001) which Sternberg (2005) even called creative leadership. Teachers who take risk, who motivate students to engage in challenging activities and who continuously monitor the relations between students are likely to improve their students' creative self-efficacy. It is then important to teach novice teachers how to behave in a transformational way, how to challenge their students and positively influence the climate in the classroom. Teacher leadership, however, is still understudied area in creativity studies, which calls for empirical studies and findings.

The pattern of the relations found in the empirical study presented in this paper strongly suggests an important role of teachers' behavior in developing students' creative self-efficacy. A teacher who behaves as a transformational leader strengthens the probability of developing positive interpersonal classroom climate and then influences students' creative self-efficacy both directly and indirectly by motivating them intrinsically. On the other hand, it may be obvious that transformational leadership could not be treated as the only factor which influences students' creative self-efficacy, or even as the most important one. There are many other factors, elements, which hypothetically influence students' creative self-efficacy. These could be modeling behaviors, teacher mentoring, teaching-specific strategies, heuristics of creative problem solving and so on. Future studies should also analyze factors other than teachers' transformational leadership.

## Limitations and Future Studies

This study as any empirical research has obvious limitations. The first and probably most important of them is the form of conducted research and formulated conclusions. Because the study was cross-sectional, the possibility of reverse causality exists. Creative self-efficacy may influence the perception of both: climate in the classroom and teacher behaviors. Longitudinal and experimental studies should incorporate designs to account for reciprocal causality.

The second limitation lies in the fact that all the data were based on self-reports made by students, and therefore the problem of common method variance exists. In future studies, methods different than self-reporting are needed to maximize validity of the findings.

The third limitation is connected with applied measures. These instruments may raise doubts for two reasons. Firstly, three of four instruments (measures of creative self-efficacy, climate for creativity, and teachers' perceived transformational leadership) were developed recently and are still extensively studied in validation research. Although the reliabilities of the instruments were adequate, future investigations are needed. The second problem — also rightly identified by Beghetto in his study (2006) — calls for more elaborate scales for measuring creative self-efficacy. The scale used in this study was reliable, yet it was composed of only three items. In future, longer scales are welcome to be developed.

Some areas of future research have just been noted as a way to overcome limitations of the study. However, there are also more theoretically sound problems that need to be studied. Probably the most important area of the studies is the relationship between creative self-efficacy and real creative achievements. Especially important is the role creative self-efficacy plays for creative accomplishments — is it an independent variable or maybe a mediator or moderator of the relationship between creative abilities and achievements? Future studies should explore this problem carefully.

The second significant area of research is the development of creative self-efficacy over life-span. According to developmental theories (Erikson, 1951) and findings which show development of the trajectories of creativity (Simonton, 1998, 2000), it may be assumed that these relations may be curvilinear and should be explored further.

A possible interesting question is one about personality predictors of creative self-efficacy. Is it predicted by openness to experience (as creative abilities) or maybe also by conscientiousness or extraversion? This problem also seems interesting and important in understanding creative self-efficacy better.

Looking from educational standpoint, future studies should deepen the nature of connections found between creative climate and creative self-efficacy, and are expected to find a clear answer to the question of the direction of causality. Such an answer improves the probability of possible applications of these findings into the school and classroom practice.

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